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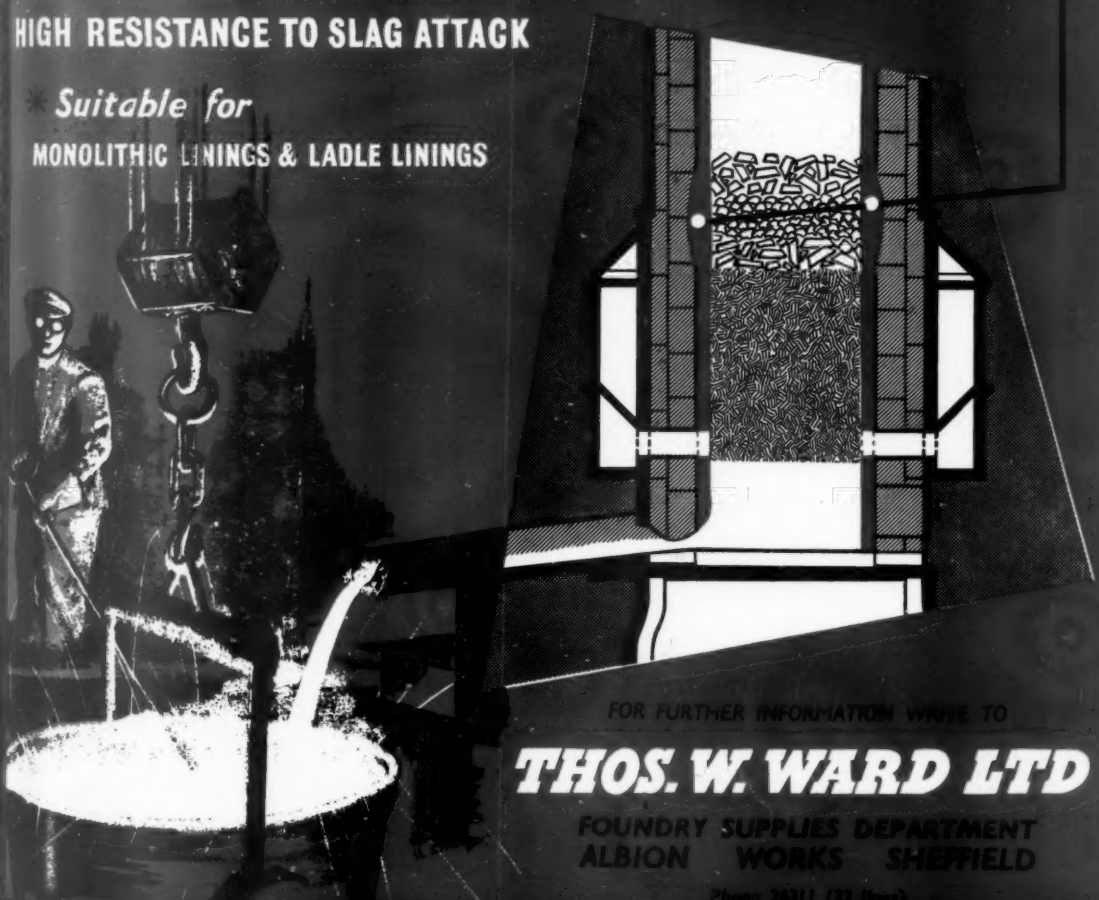

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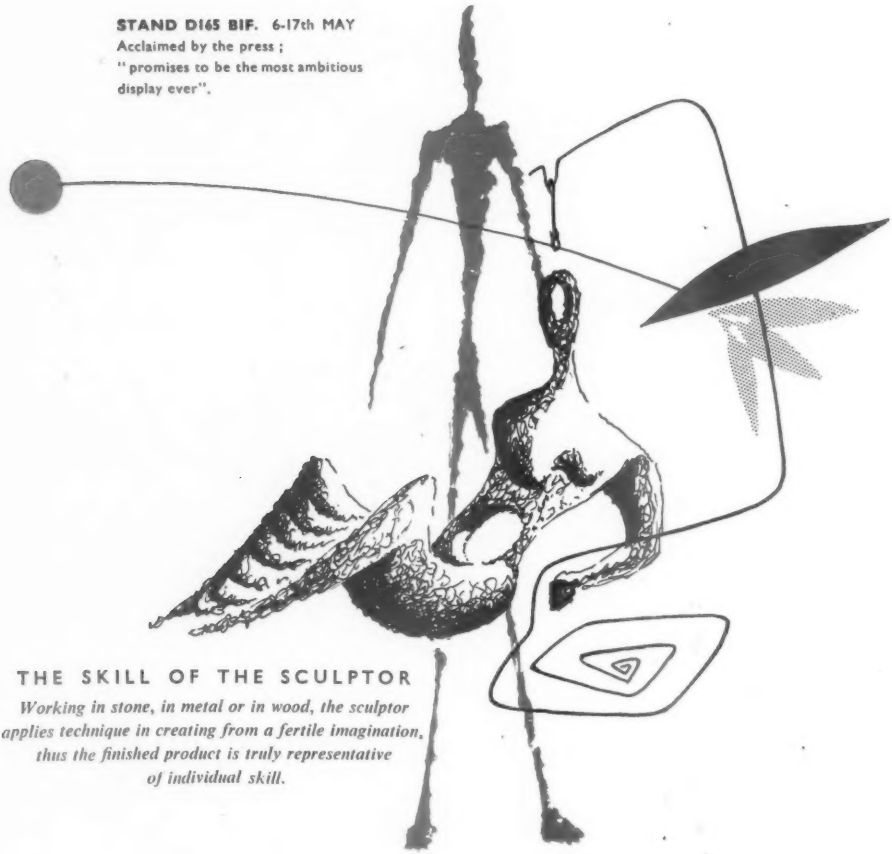

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PRINCIPAL CONTENTS

Technical :

PAGE

Steelfoundry Moulding Materials, by J. M. Middleton, A.Met.: Survey of current trends in moulding and coremaking methods and materials as applicable to general foundry practice. New methods of control are discussed as are also new processes and materials that may find application in steel foundries . . 469

Cast-resin Patterns: Report of a discussion which took place at a meeting of the National Society of Master Patternmakers last autumn . 477

New Foundry Laboratories at the Borough Polytechnic, in London 484

Some Points on Patents, by "Barrister-at-Law" 487

Features :

Leader: Progress in Foundry Equipment . 467
Correspondence 468
Equipment and Supplies 481
Publications Received, House Organs and New Catalogues 486
Forthcoming Events (Advert. section) . 29

Commercial :

Company News 488
New Patents 489
Imports and Exports of Iron and Steel in February 490
Raw Material Markets 494
Current Prices of Iron, Steel and Non-ferrous Metals 496
Contracts Open (Advert. section) . . 29

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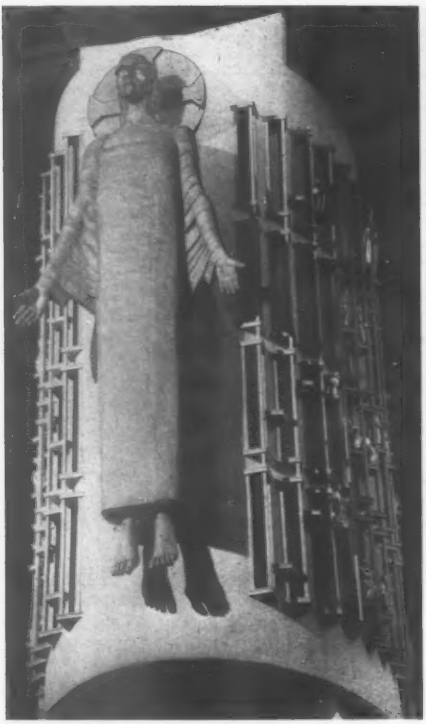
Progress in Foundry Equipment

Whilst figures are issued periodically for iron, steel, copper-base, aluminium and magnesium castings production, they give but little indication of future business trends of the foundry industry as a whole. Now, the Board of Trade has made available to us, figures which give a picture of the total capital investment of the industry under certain headings. The statistics are compiled by returns made by about 50 equipment firms in the categories of "sand-preparing machinery"; "moulding machines and boxes"; "sand-blast plant"; "melting equipment (including ladles)"; "coremaking machines, plant and accessories" and "other equipment including chaplets and studs, but excluding mechanical-handling plant and materials such as abrasives." Thus, it will be realized that the figures reported are by no means comprehensive and much has to be added to give a true picture.

The total value of material bought by the United Kingdom foundry industry during 1956, included under these headings, was £3,959,000. It is interesting to note that the equipment industry during this period exported £989,000 worth of goods, that is, roughly 20 per cent. of this total. The largest item bought by the home industry came under the heading of "shotblast plant" at a cost of just over £1,000,000; next came "other equipment," where £990,000 was spent. The sales of moulding machines and boxes totalled £915,000; that of sand-preparing machinery £586,000; of melting plant £320,000 and of coremaking machines £145,000. In exports, moulding machines and boxes easily took the lead with a total of a third of a million; next came "other equipment" at £151,000 and then "sand-blast plant" at £124,000. Sand-preparation, melting plant, and coremaking machinery, completed the list with £276,000, £63,000 and £40,000 respectively.

These figures show in no uncertain fashion the importance of the British foundry industry and its suppliers. To the £4,000,000 spent on plant, there has to be added that purchased abroad, mechanical-handling machinery, raw materials, fuel, metals and refractories. Amongst the trends that can be noted is the recent demand for shot-blast equipment, one which seems likely to continue. Whilst demand for coremaking equipment fell during the last six months of 1956, there is reason to believe that this section, too, has a bright future. The figures we have quoted are an excellent signpost to the future of the foundry industry; yet we note with interest that the Americans place more reliance on the activity of the master patternmakers as the best barometer for the immediate trading conditions. If this be so, then UK foundry business is improving, because the master patternmakers report reasonably full order books.



The illustrations show Sir Jacob Epstein's statue "Les Majestas" unveiled recently in the rebuilt Llandaff cathedral. At 18-ft. high it is the largest so far cast in aluminium by the London art founders, Morris Singer Company, Limited.

Dinner

SILICA & MOULDING SANDS ASSOCIATION

The annual dinner of the Silica & Moulding Sands Association was held at the Savoy Hotel, London, last Thursday, Mr. J. E. P. Moore presiding. There was a record attendance of about 140 members and guests. The speakers on the toast list were (in addition to the president): Mr. A. W. Clark, M.I.MECH.E., J.P.; Mr. Haydyn Taylor; and Mr. H. J. V. Williams. The company were entertained by Miss Dodine Cornwallis, soprano.

Correspondence

"RUNNING AND GATING OF SAND CASTINGS"

To the Editor of the FOUNDRY TRADE JOURNAL

SIR,—The review of the above monograph in the January 31 issue of your JOURNAL in my view does considerably less than justice to the book. It ignores its positive qualities, and the reviewer's criticisms, mainly on the grounds of omissions, are for the most part wrong or irrelevant. For example the implication that the book is almost confined to the physics of the subject is certainly unfounded because, although the author's main object was to review the principles and quantitative information on gating of castings, he did endeavour to summarize this information in terms which the practical foundryman could readily understand and apply. Again the suggestion that the gating systems reviewed are ideal and remote from practice is quite unfounded because several of the systems discussed, which conform as far as possible with ideal principles, are certainly practical as our own experience in these laboratories and elsewhere amply shows. The reviewer, in a review published elsewhere, criticizes the book because it does not include discussion on feeding techniques. In fact the influence of the gating system on feeding is discussed in this book and your reviewer himself calls attention to a complementary book largely devoted to the feeding of castings.

W. A. BAKER,
Research Manager.

British Non-Ferrous Metals Research Association,
Euston Street, London, N.W.1.
April 11, 1957.

Latest Foundry Statistics

According to the *Bulletin* of the Iron and Steel Board and the British Iron and Steel Federation, employment in the steelfoundry industry was at February 9, 20,630. At this figure it was 160 higher than in January 5, and 440 in excess of February, 1956. The estimated weekly average output of steel castings during February was 7,100 tons. The corresponding figure for January was 6,600 tons, and a year ago 6,500 tons.

The British Bureau of Non-ferrous Statistics report that the current production rate of pure copper castings is 650 tons monthly.

Steelfoundry Moulding Materials*

By J. M. Middleton, A.Met.

During recent years, certain new moulding processes have been developed, e.g., shell moulding and the CO_2 Process. The main emphasis on development work has been in the improvement and wider application of known materials and methods. Better sand-preparation and the closer control and a fuller utilization of existing methods and materials have been considered to be of more immediate benefit to the foundryman; both economically and in producing quality castings, than in the introduction of new and revolutionary methods and materials. The intention of this Paper is to survey present trends in moulding and coremaking methods and materials as applicable to general foundry practice, with some details of new methods of control, and one or two new processes and materials that may find application in steel foundries.

MATERIALS

Naturally-bonded sands are still widely used in British steel foundries, however, the present tendency is to change to synthetic sand mixes. These are more easily controllable and are more suitable for mechanized work than sand mixes based on naturally-bonded sands. Certain suppliers of silica sands are now paying more attention to the washing and grading of their sands than they have done in the past, thereby ensuring a more consistent product. The foundryman, however, is largely dependent, due to economic reasons, on obtaining his sand from the nearest deposits regardless of whether or not this is the most suited for his purpose. Medium-grain silica sands (60 to 72 mesh) are the most popular for synthetic sand mixes, these falling mainly on 3 to 4 sieves. The wider-graded 5 to 6 sieve sands favoured by certain founders in America have not been adopted to any great extent in this country. Silica-based sand is expected to be the main moulding material for a long time to come, being widely available, cheap, and having the desired rounded grains and variety of grain size. The main disadvantage with silica, apart from the health hazard, is its high thermal-expansion and its proneness to give rise to such expansion defects as scabbing, veins, rat-tails, etc., on the casting. Attempts to develop (both in this country and abroad) other refractory materials more thermally stable than silica for use as moulding media are being carried out. These include zircon, olivine, magnesite, chamotte, etc., and their possible foundry uses are discussed below.

Zircon

Zircon sand ($ZrSiO_4$), due to its high refractoriness (melting point approximately 2,200 deg. C.) and low thermal-expansion (approximately one-third that of SiO_2), is now being extensively used as a facing material and for cores in castings where difficulties due to metal penetration are encountered. Zircon has a higher thermal-conductivity and density than silica, and hence absorbs heat from the casting more rapidly than do silica sands. Zircon is normally fine-grained (150 to 200 mesh) and can also be obtained as flour, which is used as a base for mould paints and as a filler in zircon and silica sands. The main disadvantages to its extended use are its high cost (the main deposit being in Australia) and its high density. Moulds made of zircon sands are some 90 per cent. heavier than similar moulds made in silica sands.

Olivine

Many workers have commented favourably on the possibility of the use of olivine as a moulding material in steelfoundries. The use of this media in place of silica in Norwegian foundries was reported in 1949[1], and some attention has recently been paid to its application in foundries both in the USA[2] and in this country[3]. Olivine is an ortho-silicate of iron and magnesium $2(MgFe)O.2SiO_2$ and medical research has indicated that its use is free from any silicosis hazard. If of good quality, olivine is more refractory than silica and has excellent volume stability. In this respect, Parkes and Godding[4] have shown that it is much less likely to spall and produce scabs in castings than is silica sand. Olivine is said to strip easily from the casting and has been used satisfactorily for producing steel castings up to 25 tons in weight. Tests[5] in which olivine flour was used to replace silica flour in a silica sand mix, however, showed it to have a deleterious effect on casting-surface quality. This is to be expected, as olivine reacts with silica at elevated temperatures to form a lower melting-point compound (clioenstatite; softening temperature approximately 1,450 deg. C.). It is important, therefore, that where olivine is used in the foundry it must not become contaminated with silica sand. The main disadvantages with olivine are its cost (£6 to £7 per ton in this country), and its high angularity which does not allow it to be rammed as hard as rounded silica grains. The main European source of olivine is Norway and, whilst considerable deposits of olivine occur in Scotland (Skye), these are considered to be too impure to be of value to steelfounders.

Other Substitutes for Silica

Work on a number of non-siliceous materials by the British Steel Castings Research Association[6] showed that stabilized dolomite, chromite, calcined bauxite and magnesite gave a poor casting-strip, whereas olivine and zircon gave casting surface-

* Paper presented at the Moulding Materials Conference organized by the British Steel Casting's Research Association, last October.

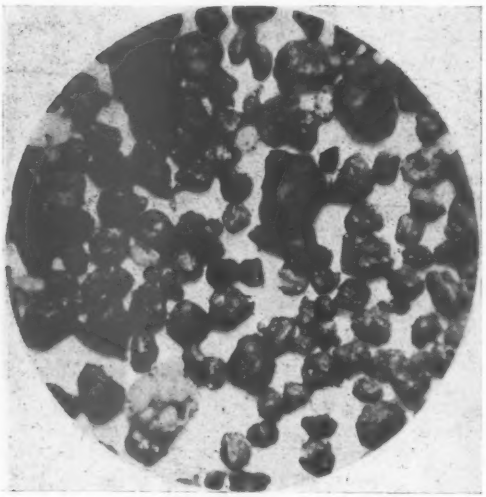


FIG. 1.—*Photomicrograph of used foundry sand* (× 15).

finish comparable to that obtained with silica sands. Calcined bauxite, however, is said to have been used satisfactorily in French foundries and the Author has seen manganese-steel castings made in silica sands containing additions of up to 15 per cent. crushed magnesite.

Fused silica (silica glass) which is much more thermally stable than ordinary silica is being used as the mould material in precision casting; economic reasons, however, rule it out as a substitute for silica sand for general foundry purposes.

High-grade foundry coke has also been suggested as a moulding material. Coke, crushed and screened and bonded with bentonite is light in weight and is said to ram well. It produces castings with no scabbing or burn-on defects. The main difficulty appears to be the high sulphur-content of normal coke, which gives off fumes of toxic SO_3 during pouring and knock-out.

Refractory Sands as Chills

The possible use of refractory materials, as chills, in preference to metal has aroused considerable interest of late. At least one foundry is using clay or oil-bonded chromite-fines satisfactorily for this purpose and silicon carbide shapes[7] have been used as denseners for iron castings. The chill rating of various refractory materials as calculated (thermal diffusivity coefficients) and from casting tests[8] are shown in Table I.

Sand Reclamation

Owing to increased freight-charges and difficulties in disposal of used foundry-sands, more and more attention is being paid to methods of sand reclamation. Various types of wet reclamation plants have been installed in American foundries and, whilst

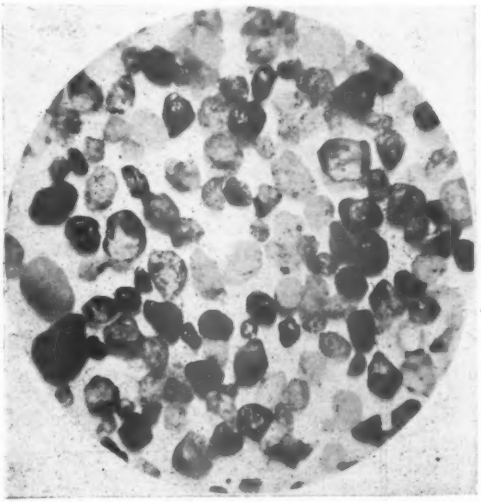
TABLE I.—*Rating of Chilling Ability of Various Refractory Materials.*

Chill rating.	(i) As calculated (thermal diffusivity coefficients).	(ii) From practical tests.[8]
1	Magnesite	Silicon carbide
2	Silicon carbide	Magnesite
3	Zircon	Alumina
4	Iron oxide (Fe_2O_3)	Zircon
5	Chromite	Chromite
6	Chamotte	Chamotte
7	Silica moulding sand	Silica moulding sand
8	Alumina	

they are costly to instal and operate, the reclaimed sand is said to have physical properties equal to new sand. The Association, in collaboration with the United Steel Companies Limited, has carried out some pilot-scale trials of wet reclamation with a simple log-washer[9]. The results obtained appeared to be encouraging as is evidenced by the photomicrographs of the used and reclaimed sands shown in Figs. 1 and 2. Further trials with the log washer in reclaiming silicate-bonded sands used in the CO_2 Process showed that it was possible to remove at least 75 per cent. of the soluble alkalis present in the used sand, by this method. It would appear from this work that with suitable modifications, the log washer might provide a relatively cheap and simple method of wet sand reclamation.

Dry-pneumatic methods of reclamation have certain advantages over wet methods, being simpler and cheaper to instal and operate. Whilst the cleaning of the sand is not as efficient as is obtained by wet methods, it is claimed that sand reclaimed by this method is quite suitable for normal moulding sand and certain core-sand purposes. Yields of between 75 to 95 per cent. of reclaimed sand are obtainable, depending upon the composition of the used sand (*e.g.*, silica-flour content), and it is claimed by certain users in America that the plant

FIG. 2.—*Photomicrograph of sand shown in Fig.* 1, *after reclamation in a log washer* (× 15).



pays for itself within 5 to 12 months of operation. Dry-pneumatic scrubbers are now being constructed in this country and the Association intends to carry out pilot-scale trials with one of these in the near future.

Bonding Materials for Moulding Sands

The CO_2 Process for hardening moulds is being used for the preparation of large moulds to eliminate the need for drying, and for certain core-assembly work. The Process, however, is not likely to replace green-sand work to any great extent due to economic reasons, and the fact that the sand is not re-usable.

The Steel Founders' Society of America has a long-term project in which they will investigate the possibilities of the use of various inorganic materials as bonds. The ultimate aim of this work is to dispense with the need for moulding machines; the moulding mix being in the form of a slurry and the moulds air-set by catalytic bonding reactions.

Bentonite is the main bonding material for most foundry purposes. Of the bentonites used, that from Wyoming is the most popular, but bentonites from other sources are also finding favour with certain steel-founders. The Association has examined a large number of bentonites from a wide variety of sources and the bonding properties of 22 of these regarded as typical are summarized in Fig. 3. This shows the green and dry strengths of Chelford sand with 5 per cent. clay and 2.5 to 4.5 per cent. water. The hatched bands show the corresponding values for Chelford with 5 per cent. Wyoming bentonite. It will be noted from the graph that certain bentonites from the Mediterranean area, *e.g.*, Greece, Italy and North Africa, have excellent properties, quite equivalent to those obtained with Wyoming bentonite. It has also been shown[10] by laboratory tests that the Greek and Italian bentonites have at least equivalent "life" properties to those of Wyoming bentonite. On this basis, it would appear that there is no reason why these bentonites could not effectively replace Wyoming bentonites in the foundry.

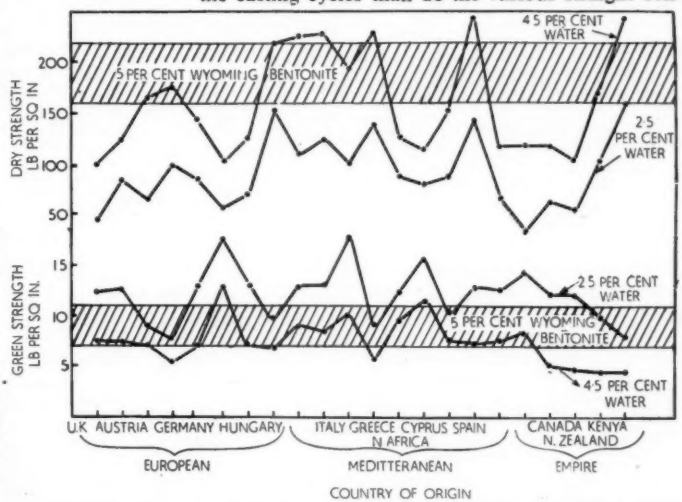


FIG. 3.—*Bonding properties of bentonites from various sources (5 per cent. bentonite additions to Chelford sand; AFS test-pieces; ten rams).*

The possible use of indigenous clays in whole or partial substitution in place of imported bentonites has attractive possibilities for the British steelfounding industry. The Association has therefore made an exhaustive survey of British clays which includes china, ball and fireclays (both siliceous and aluminous) and the properties of these are given in a BSCRA *Research Report*[11]. When used alone, these clays develop lower green and dry strengths than do bentonites, but when used to replace part of the bentonite in a mix, they have definite possibilities. The bonding properties of combinations of British kaolinitic clays and bentonites are shown in Fig. 4, from which it will be seen that it is possible to replace up to 50 per cent. of the bentonite by a kaolinitic clay without loss of dry strength; the green strength showing a linear variation with bond composition. Laboratory tests have also indicated that the bentonite/kaolinite clay mixes have better "life" than bentonites alone and this was to some extent confirmed by foundry trials. In these latter trials, a number of repeated casting tests were carried out on various mixes and, as will be seen in Fig. 5, the ball clay/bentonite mix shows less fall off in green-strength properties over the casting cycles than do the various straight bentonite mixes. Further and more extensive foundry trials are now being carried out on the bentonite/ball clay mixtures to determine if these preliminary findings are substantiated by repeated use over a long period of time under production conditions.

Native ball clays and plastic fireclays find wide application in foundries producing heavy castings, and up to 20 per cent. additions of these clays may be made to large dry-sand and "compo" moulds. The point of interest is, however, whether the kaolinitic clays could be used with advantage in ordinary green- and dry-sand practice.

Foundry Sand Additives

Many foundries, especially in America, make silica-flour additions to their mixes to act as a filler, while in this country, silica-flour additions are often replaced by the weakly bonding siliceous fireclays or by ball clays. Fine silica sand (150 to 300 mesh)

Steelfoundry Moulding Materials

has been used[12] as a substitute for silica flour both as a filler and as base for paint, but was found to be unsatisfactory.

Cereal additions are commonly made to foundry sand mixes and these improve the toughness of the mix and are said to reduce the rate of drying out of the mould, but this latter property is not definite. Wood-flour may be added to sand mixes in amounts up to 2 per cent. in order to prevent expansion scabs. Wood-flour additions, however, have a deleterious effect on moulding properties and finely-ground peat has been suggested as a possible alternative.

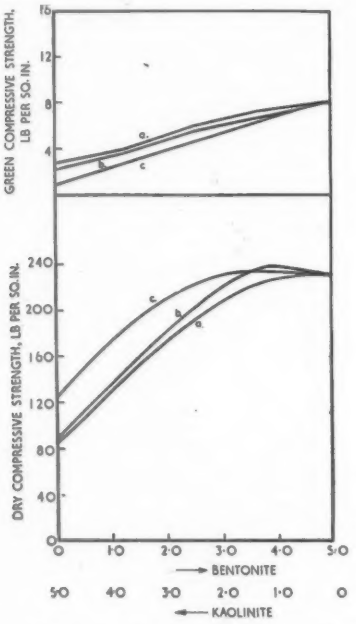


FIG. 4.—*Variations of green- and dry-compression strengths with bond composition for Chelford sand bonded with mixtures of bentonite and kaolinitic clays. (Total clay content five per cent.; moisture 4 per cent.; AFS test-pieces ten rams.)*

(*a*) Ball clay + Wyoming bentonite. (*b*) Fireclay + Wyoming bentonite. (*c*) Siliceous fireclay + Wyoming bentonite.

Certain organic materials are being added to sands to render them more suitable for high-pressure moulding. For this purpose, the sands must be worked at a low moisture-content to give good flowability and to avoid water being squeezed out of the sand under the high pressures employed. Originally liquid resin/powdered resin/bentonite mixes were used for this purpose, but recently published work[13] refers to a liquid-carbon addition being made to bentonite-bonded sands. Such sands can be worked dry or with very low moisture-contents and are said to have very high flowability and produce very strong moulds. The mixes have not as yet proved to be too successful for steel-foundry purposes.

Soil-conditioners, *e.g.*, Krilium, when added to foundry sands improve their flowability, but the high cost of these materials precludes their use for normal foundry purposes.

PREPARATION AND CONTROL OF MOULDING SANDS

The present tendency in steel foundries is to increase the amount of sand from sand-preparation units, *i.e.*, to mill all sand rather than just the facing mixes. Clay additions may be made either dry or in the form of a slurry. It is claimed[14] that adding clays as a slurry rather than as a dry powder can save up to 25 per cent. in mixing times and from 10 to 33 per cent. in the amount of bond required. The method also has the further advantage of reducing the amount of dust produced at the mills.

Electrical methods by which the moisture content of the sand can be measured and controlled have lately received much attention in the USA. Automatic sand-tempering units are now being manufactured in the United States, these can be applied to either batch or continuous mills; milling times, bond and moisture additions being entirely automatic. The actual methods of testing sands for control purposes have changed little, although less attention is now being paid to permeability and more to moisture control than in the past.

pH Control

A feature of control which has aroused considerable interest lately is the control of the pH of moulding mixes. Suitable adjustments in the pH of sand mixes by additions of sodium carbonate are said to increase flowability, green- and dry-strengths of the mix and considerably decrease the number of defective castings. Booth[15] showed that increasing the pH of certain naturally-bonded sands from 5 to pH 10, lowered the green strengths by 28 per cent, but increased the dry strengths by 700 per cent. Other investigators[16] have also found that variations in pH can affect the bonding properties of sands bonded with fireclays or bentonites, but that the optimum pH value which gives the best properties depends upon the composition of the mix. The suggested procedure for pH control is first to make increasing additions of sodium carbonate to the foundry mix determining the pH at each addition, this giving the type of curve shown in Fig. 6. It is suggested that the optimum pH for that particular mix lies at the knee of the curve, and that the pH of the foundry sand be brought to this value by suitable additions of sodium carbonate and henceforth controlled at this point.

The fundamental principles involved when sodium carbonate or other agents are added to a clay-bonded sand are fairly well understood. The colloidal material found in clays contains a small fraction of matter known as base-exchange material, the composition of which has a pronounced

effect on the properties of the total mass of clay. If the base-exchange material of a bentonite is calcium, the clay deflocculates with difficulty and does not swell, whereas when the base-exchange material is sodium, it deflocculates easily and has a high swelling capacity giving high dry-strengths to the clay. The base-exchange materials are readily replacable by others; therefore, the addition of sodium as sodium carbonate to clays can replace the calcium or hydrogen base and so improve its swelling and bonding properties. The properties of the clay are therefore more dependent upon the type of base present than on the pH value of the clay, and it is possible for two differently-based bentonites having identical pH values to have widely differing bonding properties. The fact, however, that a change in pH value occurring in a

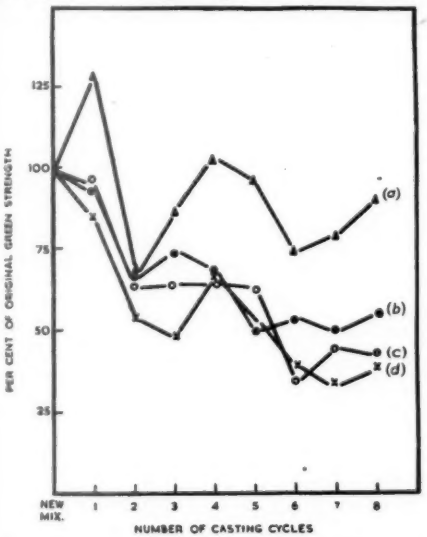


FIG. 5.—*Life properties of clays; comparison of the percentage-retained green-strengths of various clay mixes with the number of casting cycles.*
(*a*) Ball clay/bentonite mixture. (*b*) Wyoming bentonite. (*c*) British bentonite. (*d*) North American bentonite.

clay from a given source, may indicate a change that might be significant in practice and cases are envisaged where routine measurement of pH of sand mixes might prove to be a useful control. It is of interest to note that some suppliers of bentonites are now stating that the pH of their products are controlled within certain limits.

Coremaking Materials and Methods

Linseed oil is still the main ingredient of core oils used in steel foundries and although due to limited supplies in the past, other oils have been used, *e.g.*, fish oils, tall oils, petroleum extracts, etc., these have now been discarded in preference to linseed-oil-based binders. Linseed oil gives very good results over widely varying foundry conditions and seems unlikely at present to be replaced by other materials.

Cores and Binding Materials

Modified binders, having cold-setting and quick-drying properties, are finding certain applications in foundries, especially on the Continent, where they were developed. These are essentially natural oils, linseed, perilla, China wood oil, etc., containing metallic dryers (cobalt or lead naphthanate) and modified by bodying to accelerate oxidation and polymerization. The oils have quick-drying properties which can be further increased, and the oil made air setting to some extent by the addition of an accelerator, this being an oxidizing agent,

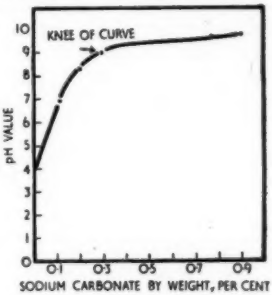


FIG. 6.—*Effect on pH of various additions of sodium carbonate to a unit foundry sand*[17].

usually an organic or inorganic peroxide salt. Curves showing the strengths obtained on air and oven drying of certain of these proprietary air-setting binders are shown in Fig. 7. It is claimed that sands bonded with these oils ram well, and hardening in the corebox overcomes sagging and eliminates the need for irons. Disadvantages are that the corebox is occupied for a considerable time and hence the method is more applicable to jobbing work.

The most promising alternatives to linseed oil for core binders are the synthetic resins. A wide range of these exist, developed primarily for the plastics industry, these have the advantage over natural oils for they require much shorter baking times, as they do not require the presence of oxygen during baking—polymerization occurs on the removal of water. Because of their solubility in water, resins tend to migrate with the water towards the surface of the cores, the curing of which produces essentially hard surfaces with softer interiors. Disadvantages of this include a tendency towards stickiness. This can be partially overcome by additions of a suitable release agent (light oil plus a fatty acid) and a relatively short storage-life.

Phenolic formaldehyde (PF) type resins are most favoured for steelfoundry purposes, the urea (UF) types collapsing too readily. One member foundry is using PF resin-bonded cores satisfactorily in the production of cores for castings of up to 10 tons in weight. A comparison of the strengths and the baking properties of various types of core binders are shown in Fig. 8.

Resin-bonded sands readily lend themselves to di-electric methods of drying, thus saving up to 90 per cent. of the time required for baking similar cores bonded with natural drying oils. Work by the Association has shown[18] that providing the electrical characteristics of the di-electric unit are

satisfactory, sands bonded with PF resins can be effectively baked by this method. It is of interest to note that in 1950, 35 di-electric drying units had been installed in American foundries.

Resins are used in shell moulding and it will suffice here to say that the process is not as yet entirely satisfactory for the production of plain carbon-steel castings, owing to poor casting surface finish. It is possible that shell cores may find general foundry application, especially now that satisfactory methods for precoating sands with resins are being evolved. The precoated sands work with lower resin-contents and blow better (there being no danger of resin segregation) than do powdered-resin sand mixes.

The use of the CO_2 Process for core production has not been widely adopted, fears being expressed that cores made by this Process do not collapse sufficiently and hence are more likely to cause hot tearing in the casting. Recently published literature refers to the use of dextrose with ammonium sulphate as a catalyst, tannin-based materials and cellulose lye as possible core binders. However, it is considered that any immediate developments in core binders will be largely confined to modifications in natural oils and resins, with perhaps an extension of the use of shell cores and the CO_2 Process.

Core Additives

Iron oxide (Fe_2O_3) additions of 1 to 2 per cent. to core mixes are very popular in the USA and in certain foundries in this country. This is said to decrease the rate of collapsibility, to prevent such defects as fins and metal penetration, and to lessen core erosion.

Additions of organic materials are also made to core mixes to give some green strength. Few changes are envisaged in the type of green binder, the common ones in use being pregelatinized starches (cereals), dextrines, molasses and sulphate lyes.

Mould and Core Paints

Zircon has largely replaced silica as a base for mould and core paints, but some foundries still favour silica, regarding this as giving better casting strip than zircon. Chrome-magnesite and magnesite-based paints are also claimed to give good results on steel castings. Bentonite is the normal addition to prevent sedimentation, and core-oil, resin or cereal, to give the necessary hardness to the coating on drying. Washes based on ethyl silicate can be obtained, but these have low shelf-life and have found wider application as investment materials in precision casting than as mould paints. Solution ceramics (refractories deposited from aqueous solutions) were suggested for coating moulds, but recent

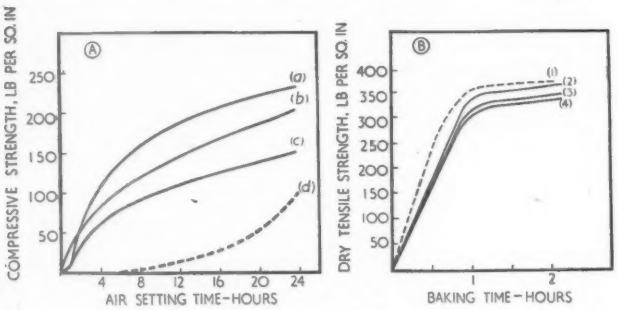
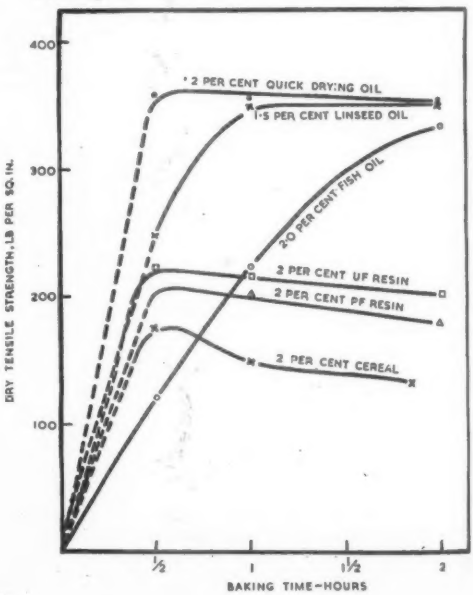


FIG. 7(A).—*Variation in compressive strength with standing time of three proprietary "air-setting" binders (Chelford sand; AFS test-pieces; three rams).*

FIG. 7 (B).—*Variation in dry tensile-strengths with baking time at 200 deg. C. of three proprietary "air-setting" binders. (Test-pieces stood for 3 hrs. before baking; Chelford sand; three rams).*

(*a*) 1.75 per cent. oil A + 0.15 per cent. accelerator. (*b*) 1.75 per cent. oil B + 0.04 per cent. accelerator. (*c*) 1.75 per cent. oil C + 0.05 per cent. accelerator. (*d*) 1.75 per cent. oil B no accelerator. (1) 1·5 per cent. linseed oil. (2) 1·75 per cent. oil B. (3) 1·75 per cent. oil C. (4) 1·75 per cent. oil A.

FIG. 8.—*Core binders: comparison of the dry tensile-strengths and baking times of various types of core binders. Baking temperature 200 deg. C.*



work has shown that steel castings made in moulds coated by this method showed a high degree of surface porosity.

Resins, when diluted with water or alcohol, may be sprayed on to green-sand moulds, the spirit resins being ignited. These give hard surfaces to the moulds and can extend the range of work that can be made in green sand.

Permanent Moulds

A process for manufacturing steel car-wheels in permanent graphite moulds has been developed by an American company[19]. The process, however, necessitates the use of a complicated pressure-pouring method to prevent mould erosion and is only applicable in the mass production of identical castings. The graphite moulds are coated with a silica wash and castings of up to 700 lb. in weight are cast in the moulds.

The Russians claim[20] that they are making castings weighing from a few ounces up to some tons in permanent moulds, steel moulds being used for the large castings and iron moulds for the smaller work. All the moulds are given a refractory wash, but it is noted that all top parts for the moulds are made in sand. The main casting defects encountered are hot tearing, blowholes and misruns. It should be noted that permanent moulds are only applicable to the mass production of fairly simple castings.

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THE ELEVENTH CONGRESS of the International Scientific Film Association will be held in Amsterdam at the Royal Institute for the Tropics, from September 21 to 27.

Founder—Founder—Founder

Frederic Evans, O.B.E., M.A.

These three identical words are yet far removed from each other in meaning. The first is how one describes the man who "founds" an institution or company. This word *found* is derived from the Latin *fundare* (*fundus*) meaning bottom. It arrived in the English language by way of the French verb *fonder*.

The second means almost the exact opposite and describes the falling down of a building, the sinking of a ship and indeed the breakdown of a horse through overwork. Curiously, this also comes from the Latin *fundus*—bottom—but the Old French form *fondrer* meant to "go to the bottom" rather than "build up from the bottom" as was the direction by which the first usage of the word emerged.

The third meaning, of the founder in iron or other metals, comes from the Latin word *fundere* (*jus*) to *pour* by way of the French *fondre*—hence foundry, where molten metal is poured into moulds.

So many words concerned with the smelting of metals have come to us through the French because the blast furnace was introduced to this country from France in the 15th and 16th centuries. Henry VIII encouraged the settlement in Sussex of French ironfounders so that many French surnames survive to this day in the Weald of Kent and Sussex. For example, words like *tuyere* or *twyer* (from the French *tuyau*, pipe,) to describe the pipe through which air is forced into a furnace, or, again, *furnace* from Old French *fornais* meaning an *oven*. The Welsh word for "oven" is *fwrn*.

However, a common term with ironfounders is very English—*pig-iron*. Originally the molten metal from a blast furnace was run out into a fat channel mould in the sand and this mass, owing to its shape, came to be called a *sow*. Then someone had the bright idea that to facilitate the breaking up of this *sow* for the puddling or other furnace, the channel part of the mould should be made very narrow, and smaller branch channels impressed at right-angles to it, in the sand. These smaller castings came naturally to be called *pigs*, hence the term *pig-iron*, a word which all the world understands.

[The Editor always had the impression that a sow was a sow because it "fed," in the foundry sense, the "pigs." Otherwise it might have been designated a "hog." The French call a pig a salmon and mottled iron "trout-ed."]

Italian Ironfoundry Output

Last year, the Italian iron foundry industry produced about 650,000 *tonnes* of iron castings, or about 6.5 per cent. more than in 1955. Recent progress of the activity of Italian iron foundries is illustrated by the following otuput figures (*tonnes*): 1938, 400,000; 1952, 497,000 (66); 1953, 530,000 (71); 1954, 600,000 (75); 1955, 610,000 (77); and 1956, 650,000 (80). The figures in parentheses denote the percentage of the total capacity utilized.

a

Padua Fair

The Padua Fair to be held from May 29 to June 13 is a general fair with 27 trade groups covering mainly the packaging, refrigeration, building, and agricultural industries. Among other industries well represented at the Fair are those concerned with woodworking machinery, domestic electrical-appliances, radio and television, sporting goods, motor cycles, sewing machines, office machinery, etc. Trade-information booths of the various participating nations are to be housed in the business centre, and were occupied at last year's fair by 21 countries including the UK; the latter is to have an official information booth at this year's event.

It is announced that UK manufacturers of products covered by the Padua Fair who wish to make their trade literature available for distribution to enquirers at the UK official information booth, or who wish to supply display posters, are invited to send a small selection as soon as possible to the British Consulate, Accademia 1055 Venice, marking the package "Trade Literature for use at Padua Fair."

Kariba's Immensity

Dr. H. Olver, the engineer who controls the construction of Kariba Dam, South Africa, has stated that it will be large enough to store sufficient water to supply London, for more than 300 years. When full, the dam will be about 2,000 square miles in area. Dr. Olver added that the raw material for the dam and powerhouse would be taken from local quarries. The main programme, to be finished in 3½ years, would need an average concreting rate of more than 5,000 tons a day during the peak period. Transmission lines would stretch for almost 1,000 miles and the voltage selected was 330,000, with provision to increase to 380,000.

Work is reported to be well forward with the cutting of the diversion channel inside the north bank coffer dam at Kariba, two giant earth-moving trucks being employed on this job cost more than £10,000 each.

ASSOCIATED AUTOMATION, LIMITED—Mr. G. H. Barker has been appointed to the board.

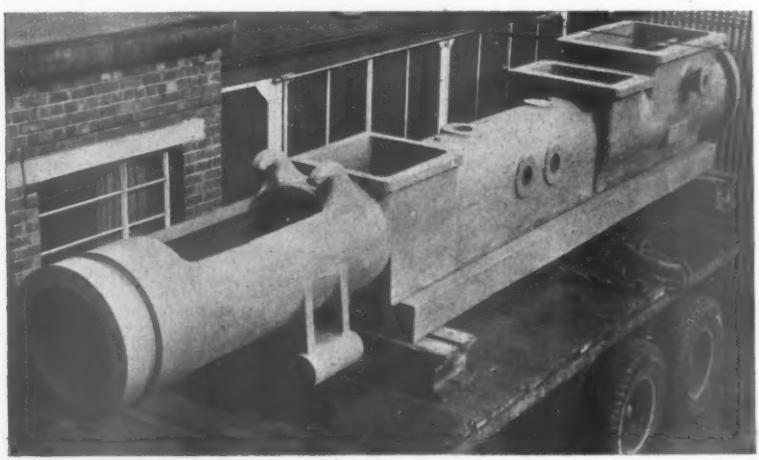
Keighley Stoppage averted

Following a meeting in Keighley on April 3, men employed at the Strong Close foundry of Prince-Smith and Stells, Limited, worsted machinery makers, decided to resume work. They went on strike because two foundry labourers refused to pay a special union levy imposed to meet strike pay for members in other parts of the country. The two men concerned attended the meeting, after which the union branch secretary announced that they had agreed to pay the 10s. levy, plus a substantial fine. According to a local newspaper, one of the two men had said before the meeting that they did not begrudge paying the 10s. levy but they had refused to pay because of the "blustering methods" used to get it. He said that they were more or less threatened that it would cost them their jobs if they did not pay up, on the other hand it had not been thought they would bring the other men out on strike. He said it was their intention to promise to pay the 10s., not for the union, but for the sake of the "lads," adding "There has been too much of this stiff-arm tactics lately."

Film settles Liability

At Leeds Assizes on Thursday, March 28, a film was used to settle a civil action, in which Joseph Arthur White, aged 35, claimed damages against his former employers, Ideal Boilers & Radiators, Limited, of Hull, in respect of a crushed toe sustained when unloading a 25 cwt. bath from a trolley at the defendant's premises. Mr. Justice Oliver, giving judgment for the defendants, said it had been contended on White's behalf that the weight of the bath was too much for one man to handle and that mechanical handling should be used. The Judge said he had had the inestimable advantage of seeing a film showing the work being done by one man with ease and nonchalance. During the past six years the same process of handling had been applied to about 30,000 similar baths without any accident occurring, and he held that there was no negligence on the part of the defendants.

BRITISH AMERICAN METALS COMPANY, LIMITED—Mr. D. C. P. Neave has been appointed a director.



This steel casting was made at F. H. Lloyd & Company Limited, Wednesbury. It is a jockey carriage for use on a pilger mill for Wellman Smith Owen Company, Limited, and will be installed in the plant of Stewarts and Lloyds Limited, at Clydesdale, Scotland. Its length is 26 ft. 8½ in.; its height 3 ft. 11 in., and weight 19 tons 15 cwt.

Cast-resin Patterns

Possibilities of New Material discussed by NSMP

In the following is a report of the discussion which took place at a meeting of the National Society of Master Patternmakers. Points that were raised included the use of metal-sprayed wooden-patterns; comparative costs of the epoxy-resin process for patternmaking and of the fillers used. The effect of the process on the incidence of dermatitis, and application of cast-resin patterns to shell moulding conclude the main topics raised.

At a meeting of the National Society of Master Patternmakers held in the Charing Cross Hotel on September 12, 1956, the president, Mr. L. Brown, took the chair and a paper on "Cast-resin Patterns" was presented by Mr. L. W. Taylor*.

THE PRESIDENT said that the subject to be discussed was a very interesting one, for the use of resin for patterns was a development which was gaining ground. He recalled the report which members of the Society had produced after they had visited France, in which it was stated that a large number of French patternshops were employing the resin methods for producing patterns. He was glad, therefore, to introduce Mr. Taylor, who represented a company which was in the forefront in that particular development.

Mr. TAYLOR, in presenting his Paper, exhibited a number of moulds to illustrate the results obtained by the methods described in the Paper and demonstrated the manner in which the plates are made.

Mr. B. LEVY (past-president) said he presumed that when Mr. Taylor had referred to the use of "red sand" he had meant Mansfield sand; and on ascertaining that that was so, he asked if the reclamation of the sand for further use was practicable. He did not expect that more than one cast could be made per mould; but could the sand be reclaimed? Also, he did not quite follow the spraying process which Mr. Taylor had mentioned, and he asked for a restatement.

Mr. TAYLOR said that one could not make more than one cast from the sand mould, but the sand could be reclaimed.

Mr. LEVY asked if contamination of the sand through being in contact with the resin was deleterious.

Mr. TAYLOR replied that it was not.

Sprayed Wooden Patterns

Mr. TAYLOR, speaking about the low-temperature alloy-spraying process, said that if one had a new wooden pattern one could spray it with a low-temperature alloy.

Mr. LEVY gathered that Mr. Taylor was referring to the production of a reverse-mould where one would use a metal spraying gun and build up a sufficient thickness of sprayed metal, remove the pattern and pour resin into the metal mould.

Mr. TAYLOR agreed that one could use that kind of gun, and he added that such moulds were permanent.

Mr. LEVY asked if that kind of metal was suitable for reproducing a series of patterns.

Mr. TAYLOR agreed that it was suitable.

Mr. LEVY suggested that the cost of producing such a mould by metal spraying was rather high.

Mr. TAYLOR said the metal his company used was not very expensive.

Mr. LEVY said that his company did not spray the metal. Using a fusible alloy melting at about 100 deg. C., they merely poured it.

Mr. TAYLOR said that in the experiment he had mentioned a spray was used.

Mr. LEVY added that his organization had found they could produce a good mould by pouring the metal, which was Cerromatrix. It was also found that a coating of ordinary stoving black-lead was advantageous to release.

Mr. TAYLOR agreed that one could get a good release in that way.

Resin Moulds

Mr. J. J. HARVEY (member of Council) said that when in France he had gathered that one of the patternmakers had made a mould of the resin material itself.

Mr. TAYLOR agreed; for example, if they were producing a door panel for a car they would make a master, then turn it over and make the secondaries off the master.

Mr. N. GOTT (vice-president) said that in describing the production of a plate, Mr. Taylor had referred to a master pattern from which a sand mould was produced. He asked if the accuracy of the plate was dependent on the accuracy that would be obtained from the sand moulding.

Mr. TAYLOR replied that that was so, and that he believed he was right in saying that in America, patterns up to the size of turbine casings and covers had been produced in epoxy resin.

Mr. GOTT doubted the economy of the process in connection with pattern equipment of this size.

THE PRESIDENT commented that it was difficult sometimes to tie up the economics of industries in this country with those of the United States.

MR. W. D. HARTLEY (member of Council), asked what was used as a filler, and what was the price of the epoxy resin used. One had heard of epoxy resins, used in thicknesses of $\frac{5}{16}$ or $\frac{7}{16}$ in., which might cost 4s. to 5s. per lb., and the cost of the resin and the filler together would be from 4s. to 6s. per lb. Then he recalled Mr. Taylor's reference to operatives wearing rubber gloves when handling

* The Author is associated with Aero Research, Limited. The FOUNDRY TRADE JOURNAL of November 10, 1955, carried a descriptive article on the epoxy-resin process, written by Mr. Taylor's colleague Mr. D. B. Orr.

resin and he asked if a pair of rubber gloves was quite enough protective clothing. He also asked what advantage the epoxy resin might have over aluminium cast plates. If, with an epoxy resin cast, one made a slip it became necessary to make a new cast, and the cost became a serious factor.

Filler Costs

MR. TAYLOR, dealing with the question concerning the type of filler used, its price and quantity, said that in all the patterns he had exhibited the proportions were 1 lb. of resin to 2 lb. of filler, which cost from 2d. to 4d. per lb. In each case a hardening flour was employed. The cost of the resin in reasonable quantities, such as 50-lb. lots, was about 12s. per lb. So that, using 1 lb. of resin with 2 lb. of filler, the cost of the 3 lb. of the mixture was about 13s. The hardener cost about 6s. per lb., but one used only a small quantity.

Dermatitis

The use of rubber gloves kept resin away from the skin in the course of such work as dipping the glass cloth into the resin. The drawback with resin was that one could not wash if off the hands with water. Where people used acetone for this purpose he was always worried about the possibility of dermatitis arising because one washed the grease and natural oil out of the skin, and that was a cause of dermatitis. Another factor contributing to dermatitis was that the persons concerned with the process were not hygienic in their habits.

He did not think that patternmaking costs were going to be any higher with this process than with plate work.

MR. HARTLEY said that from practical experience he felt that the epoxy-resin process was outstanding, but he understood that it was not cheaper than the other methods employed.

THE PRESIDENT pointed out that there were dermatitis cases arising in almost every large factory in this country, every week, but they did not condemn all the processes used in those factories. He had literature from America concerning epoxy resins and in no instance did it suggest that those resins were dangerous or state anything more than that the operators should be told to wash their hands regularly; there was no mention of fume extraction or the wearing of protective clothing.

MR. TAYLOR, taking the point a little further, said that dermatitis could be contracted from all sorts of things, including sawdust. There were two major causes of dermatitis from resin; one was the resin itself and the other was the hardener used. A straight epoxy resin was very viscous, like thick treacle; but resins were modified to give a low viscosity. They could be modified by other types of resins and by other chemicals. His company produced an epoxy resin with a plasticizer, and there was no danger from the plasticizer used.

With regard to fume emission, he said that if people were making resin patterns all day and every day in a small shop having a low roof (the sort of place in which one could "cut the air with a knife"), one would find employees with red eyes, and so on, but in a well-ventilated shop there would not be any trouble. There was danger in industries where a lot of the material was used; but the producers were fully aware of that and were trying to arrive at a hardener which was non-dermatitic.

Contraction

THE PRESIDENT recalled a remark by Mr. Taylor that the contraction of the material was negligible, and asked if he would define "negligible."

MR. TAYLOR said it was a matter of controlling the temperature, of storing and working the resin. If the working temperature were below 60 deg. F. and the resin were stored at below 122 deg. F., there would be no exotherm and no contraction.

MR. E. C. ROWAN asked if that meant that one had to control the atmosphere.

MR. TAYLOR replied that if the temperature of the resin were above 65 to 70 deg. F. and if there were a large bulk of it, after two hours it would be at 155 deg. F. If one were making a deep bucket shape one would have to use 300 per cent. of filler. It was a question of keeping the resin content to a minimum and the filler to a maximum, then there was less chance of reaction taking place.

THE PRESIDENT suggested that virtually, if the material were stored correctly, there was no contraction.

MR. TAYLOR replied that this had been proved in this country and he added that one firm had tried another method of filling. They had inserted expanded metal, and at each edge of the plate they had placed a strip of steel about $\frac{3}{16}$-in. thick. That method had worked perfectly and was a good reinforcement, however, when the patterns were stored from the summer right through to the winter they had cracked, due to the difference in expansion between the metal and the resin. His company held that there should be no external reinforcement; any reinforcement should be internally situated.

THE PRESIDENT remarked that Mr. Taylor did not agree, therefore, that they could be stored in a frame.

Mr. TAYLOR replied that they could be kept in a frame, provided they had the necessary thickness of resin.

Mr. HARTLEY asked how steel bushes would suffice.

Mr. TAYLOR said that if a bush were used there was a small amount of material; the whole length of the patternplate was about 18 in. He had never seen them crack; the inserts which his company usually put in were bushes, and they had not experienced any trouble.

Mr. F. A. MARRIOTT asked if a special technique was used when a top and bottom mould was to be cast.

Mr. TAYLOR said it was only a matter of tipping it on its side and casting it by leaving the whole of one edge open. He usually tilted it so that the long side was upwards, and he filled it very slowly. He emphasized that the mould should be filled as slowly as possible. Perhaps some moulds were completely sealed; pointing out that the resins were modified and had a fairly low viscosity, he said the

viscosity of water was 1, and that of the epoxy resin which his company used was about 1.3 or 1.4. If it contained 200 per cent. of filler it would still run.

Mr. ROWEN, referring to the Author's plaster moulds, asked if his "dentifrice" was ordinary plaster of Paris.

Mr. TAYLOR said it was.

Shell-moulding Application

Mr. B. LEVY, seeking information on the application of epoxy-resin patterns to shell moulding, said that presumably they could be used at temperatures up to 230 deg. C. with the ordinary filler.

Mr. TAYLOR replied that for that purpose one used different resins, hardeners and fillers, hot cured; one using an unmodified epoxy resin. The only limiting feature was obviously the charring-point of that resin, which was at about 230 deg. C. The softening point of the resin depended on the curing agency used, the filler normally employed being aluminium powder.

Mr. LEVY commented that aluminium powder was used with a different resin and a different hardener; Mr. Taylor figured that the material would withstand a warming up temperature of 200 deg. C., and that it would char at something over 300 deg. C.

Mr. TAYLOR agreed, adding that it would soften at much below the charring temperature. The working temperature would not be much beyond 200 deg. C. because the material would soften.

Mr. LEVY said that obviously the application of the patterns would depend on their shape and type. One could not use an intricate pattern with a thin face which was made of that material, for it would soften and distort immediately. For shell moulding one would need to have some simple solid shape which had some degree of heat dissipation in itself; any really intricate design would be prohibitive because of the tendency to char and soften.

Mr. TAYLOR agreed that that was so because of the tendency to soften. One obtained a comparatively inexpensive pattern for a shorter run.

Mr. LEVY did not think, therefore, that epoxy-resin patterns were really practicable for shell moulding, for the simple reason that the greatest application of shell moulding to foundrywork in general was in the production of accurate castings of intricate shape. More often than not, there were some details—bosses and such like—which from one's previous elucidation would indicate softening, resulting in mis-shaping of the pattern.

The normal practice in shell moulding was to heat up the pattern, overheat it, and then to test the patternplate with a Tempilstik—his company did not use a pyrometer for that purpose—if the Tempilstik melted they knew the plate was hot enough. It did no damage from the shell-moulding point of view to have the patternplate too hot at first and to allow it to cool down. If one used resin, however, the overheating would ruin the pattern.

Mr. TAYLOR agreed that the field of application would be limited.

THE PRESIDENT suggested that perhaps Mr. Taylor would say more about that when he had studied the subject more fully. Patternmakers, he continued, seemed to have one outstanding ability, and that was to pick holes in anything that was new; foundrymen followed much the same course. But something which had to be guarded against was that, since the last war, particularly, very many new methods had been introduced for the foundry and the patternmaking industries, and people sometimes were carried away by them. When shell moulding was introduced, some people suggested that in a few years castings would not be made in any other way. Then, when the pressure-cast method was introduced, pressure-cast pattern equipment only would be used, and now epoxy resin had come some people will advocate the use of nothing but resin patterns. Patternmakers would be extremely foolish, however, if they ignored the possibilities of the process under discussion and he was sure they would look into it extremely carefully.

Mr. LEVY, proposing a vote of thanks to Mr. Taylor for the great care he had taken to present to the meeting a clear picture of what could be done by the cast-resin pattern-process, said he had also taken the questions put to him, and the chaff, with amazing good humour. One was quite certain that his audience would leave the meeting a little wiser as the result of his elucidation, and for that alone they should all be extremely grateful.

Mr. HARTLEY, seconding, assured Mr. Taylor that his audience were very much impressed by his lecture; it had been very helpful, and all the questions which had been put had the purpose of helping along the new method, which he knew had a great future. Aero Research, Limited, had done great service by the experimental way in which they were dealing with it, and he was very happy to have the opportunity to say "thank you" to Mr. Taylor for addressing the meeting. (The vote of thanks was warmly accorded.)

Mr. TAYLOR, responding, said he hoped the Paper and discussion had been of help to the patternmakers. Naturally he took all the knocks with good humour, for he was a foundryman himself.

Mr. SUTTON voiced the thanks of the meeting to the president for his conduct of the meeting, and his remarks were applauded. He added the request to Mr. Taylor that some practical demonstrations of the new method might be given, certainly in the Midlands.

Mr. HARTLEY said he hoped that demonstrations would be made available to all members of the Society throughout the country.

THE PRESIDENT assured the meeting that the Council of the Society would see what could be done about demonstrations; he had received from Aero Research, Limited, a note requesting that persons seeking information on demonstrations should write to the company.

At a luncheon which preceded the meeting, the president on behalf of the members congratulated Mr. V. C. Faulkner on his recent award of honorary membership of the German Foundrymen's Association.

Long Service recognized at Kirkland

The National Steel Foundry's canteen at Kirkland Works was the scene, last month, of a very enjoyable occasion, when the directors of the company entertained to dinner over 80 employees who have each served the company for 25 years or more. Incidental music, and a variety concert after the dinner added to the pleasure, and each of the invited guests received a blue and silver badge suitably engraved. The chairman of the National Steel Foundry, Mr. C. H. Kain, presided, and the other directors present included Mr. C. J. Lake, Mr. E. L. Elliot, Mr. J. C. Simonson, Mr. S. B. Perry, and Mr. Ogilvie; an apology being submitted for Mr. P. B. Lake.

The toast of the "National Steel Foundry" was proposed by Mr. Andrew Morton, who described how some 33 years ago, he had come to the National Steel Foundry as a turner for a guaranteed period of six weeks. He considered the investment to be the best he had ever made, and spoke with pride of the harmony and goodwill between employer and employed which had led so many of his colleagues to serve for long periods with the one company. Touching upon the change of ownership at the end of 1955, Mr. Morton referred to further evidence that the welfare and contentment of the employees was still the company's object and desire.

In his reply, Mr. C. H. Kain spoke of changes and development, and stressed the policy of the company to provide so far as it was possible, a continuity of employment and satisfactory working conditions so that the loyalty of past and present staff and workpeople could be reflected in the attitude of those who would follow. The extensions and developments now taking place might convince employees that fresh types of work, modern machinery and continued progress were the constant aim of the management; and he referred to the association, dating back to 1914, between the steel foundries at Leven and Braintree, which, although for a time interrupted, was now resumed so that the prosperity of both factories was the concern of all employed in both places.

Mr. Kain presented the "25 year" badge to Miss M. D. Bell (one of the two ladies to qualify—the other being Miss E. Nimmo) and to Mr. Peter Thornton, chief metallurgist, whose service dates from 1914; he expressed regret that circumstances prevented the attendance of eight people, to whom a badge, menu and gift had been sent.

Thereafter a most enjoyable entertainment was provided by an Edinburgh company under the direction of Mr. Howard Whitehead; and the evening was further felicitated by music from the Buckhaven High School Quintet.

ECSC Loan Oversubscribed

An offer in New York of $25,000,000 of 5½ per cent. secured bonds and $10,000,000 of 5 per cent. secured notes of the European Coal and Steel Community has been oversubscribed, state the underwriting managers, Kuhn Loeb & Company, First Boston Corporation, and Lazard Fréres & Company. M. René Mayer, president of the ECSC High Authority, signed the contract launching the loan on Monday.

The High Authority was to meet to decide how the funds would be shared out among the applicants "whose total demands are three or four times bigger than the money loaned," said M. Mayer.

Industrial Output Unchanged

Slight fall in total factory production has been offset by higher output in mining, building, and public utilities, so that the level of output in British industry still shows no significant change. Provisional figures for the index of industrial production in February (average 1948=100) estimated output at 142 to 143. When this figure is adjusted to allow for seasonal variations it works out at 136 to 137, compared with 136 for the two previous months, and averages of 137 for both 1955 and 1956. In March, 1955, the seasonally adjusted index number was 136.

As engineering and shipbuilding account for 29 per cent. of the UK total industrial output, the March index figure will be affected by the strikes. In the final quarter of 1956, production in the engineering, shipbuilding, and electrical goods category showed a fall of almost 4 per cent. on the last quarter of 1955 and, over the year as a whole, the fall was 2½ per cent.

Apart from the engineering group there was a fall in production in 1956, compared with 1955, in non-ferrous metals and a number of other categories. Exceptions included the steel industry, which recorded a 3 per cent. rise, and the chemical industry, 3½ per cent. There was a small rise in mining and quarrying and an increase of 4½ per cent. in the output of the gas, water and electricity industries. Coal output in January showed no change on January, 1956, but in February the increase on a year ago was 5 per cent. Steel output was up 3 per cent. in January and 4 per cent. in February, on the same basis of comparison.

Less Unemployment

Unemployment in March fell slightly to 1.7 per cent. The February figure was 1.8 per cent. and that for March, 1956, 1.2 per cent. The percentage represents 363,000 persons, of whom 335,000 were wholly unemployed and 28,000 were temporarily stopped.

During February, civil employment in Britain fell by 30,000 to 22,950,000, though there were slight rises in the basic industries, mining and quarrying going up by 2,000. There was no change in chemicals and allied trades, and metal manufacture, but in engineering and the manufacture of metal goods and precision instruments, employment decreased by 8,000. In the week ended February 23, about 109,000 factory workers were on short time, 37,000 less than a month previously, but 43,000 more than a year ago. About 1,500,000 production workers were on overtime, 103,000 fewer than three months' previously, and 61,000 fewer than a year before.

BTH Contracts for Rail Electrification

Contracts valued at nearly £1,000,000 have been received by the British Thomson-Houston Company, Limited, from the British Transport Commission. They include switchgear and high-speed circuit-breakers required for the electrification of Kent coast lines of the Southern Region of British Railways. The equipments will be installed in 31 substations in the east Kent area.

The switchgear includes 111 33-kV, 750-MVA Class MF.36 metalclad equipments exactly similar to the 106 equipments supplied by BTH for the Southern Region change of frequency scheme, from 1953 to 1957. The high-speed circuit-breakers, of which there are 316, are truck-mounted and will be installed in the 31 substations and in 33 track paralleling huts.

Equipment & Supplies

Molten-metal Holding and Ejection Unit

Birlec, Limited, electric-furnace manufacturers, of Tyburn Road, Erdington, Birmingham, 24, announce that they have just completed construction of their first units for holding molten aluminium- and zinc-alloys (Fig. 1). The equipment is used to supply predetermined quantities of metal to die-casting machines and is primarily intended to be fed with molten metal from some auxiliary supply. Rated at 20 kw., the unit has an average power-consumption of 10 to 12 kw. per hour with a capacity of 300 lb., and a maximum pouring-rate of about 2 lb. per sec.; the quantity of metal delivered per "shot" being adjustable between ½ and 10 lb. Several units are being built under the terms of the firm's agreement with the Ajax Engineering Corporation of America, under the trade name Birlec Ajaxomatic. One of these units is at present undergoing exhaustive tests in the company's research laboratory.

In terms of the required electrical supply, the unit employs a coil supplied with alternating current from normal-frequency mains and is equipped with an iron core to concentrate the magnetic field; this passes through part of the furnace charge which acts, in effect, as a short-circuited secondary-winding of a transformer, carrying a heavy-induced current. The molten metal in the bath is thermostatically controlled at the required temperature. A standard refractory-lining as used for aluminium melting is employed in the holding chamber.

Operation

The lid gear is effectively air-sealed and compressed air, introduced above the melt, causes a quantity of molten metal to be forced up the pouring spout from a point below the surface. The quantity discharged in this manner can be accurately regulated by controlling the duration of application of compressed air. An automatic device compensates for the difference in volume within the holding chamber caused by each successive shot. The control panel is divided into two sections. The first contains the standard temperature-regulators and furnace controls. The second, in addition to featuring the timing controls which regulate the compressed-air supply, contains an automatic device that controls a supply of heat to the pouring spout. This auxiliary supply is essential to prevent the molten metal from chilling during discharge. The operation of the unit is claimed to be very simple. Once the timing dials are set, the actuating button is pressed and the required quantity is automatically delivered from the spout in a gentle controlled stream which can be directed into the chamber of the die-casting machine.

The unit is primarily intended for the automatic delivery of molten aluminium from the holding chamber. Since the space above the melt is sealed by the close-fitting lid gear, special provision can be made for an inert atmosphere; by virtue of this feature the holding unit can also be employed for magnesium die-casting.

Advantages Claimed

The following advantages are claimed for this type of equipment: Since the metal is discharged from a point well below the surface, freedom from contamination is ensured; surface oxides and scum, which frequently adhere to a ladle during hand pouring, are completely eliminated; the temperature is accurately controlled to the moment of discharge, the unit delivers the same predetermined quantity each time the mechanism is actuated; since there is no manual handling, the casting cycle can be shortened appreciably, giving a significant increase in output; the unit is cool and clean in operation and there is no splashing of metal. Furthermore, the operator suffers no discomfort from heat, and enjoys unrestricted movement. It is possible to incorporate limit-switches on the associated die-casting machine, so that the electrical circuit on the unit is initiated at the required time during the cycle of operation.

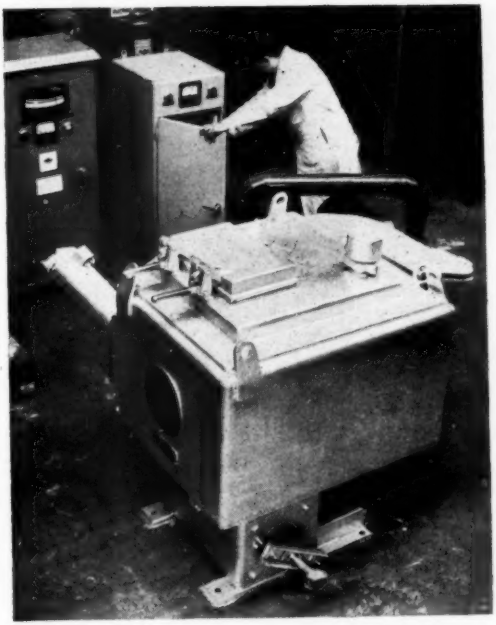


FIG. 1.—*Birlec "Ajaxomatic" metal holding unit for aluminium- and zinc-alloy die-casting; of capacity 300 lb. of aluminium, it has a consumption of 10 to 12 kw. per hr. The pouring spout can be seen on left side of the unit, and the charging door diagonally opposite, on the right.*

Melting Furnace

A really new type of oil-fired melting furnace is to be shown by Lees Hall & Sons, Limited, Denton Corner, Seaford Road, Newhaven, Sussex, on stand No. D. 347 at the British Industries Fair. It has been given the not euphonious name of Cupoila, probably because it retains the characteristics of a cupola but is oil fired. The replacing of coke by oil has the obvious advantages of reduction of the costs to be associated with handling of the coke and the removal of the unburnt fuel and slag. This, a non-crucible type of furnace, has a cupola drop-bottom hearth and the usual taphole.

The furnace consists of two transverse chambers for melting, with two vertical shafts for pre-heating and charging of the metal, which, when molten, runs into a well in the centre of the furnace. This area also

FIG. 2.—*Cupoila furnace, developed by Lees Hall & Sons, Limited, shown as part assembled for testing at the originators' works. Models are available for melting from* 10 *cwt. to* 5 *tons.*

forms the run-off or tapping position. Each vertical charging shaft is in itself a high-temperature pre-heating chamber with swinging top covers to prevent heat losses after charging. The burners which are placed at opposite ends, use preheated air, initially supplied from an independent oil heater, and later by a built-in exchanger. A test run on a small 10 cwt. furnace (Fig. 2), when melting cast iron, gave an oil consumption of the order of three gallons per 100 lb. metal melted. The plant is available in a range covering 10 cwt., one, two, three and five tons capacity. It would appear easy to rebrick and simple to operate.

Portable Drill

A general duty, ½-in. capacity, two-speed portable electric-drill has now been introduced by Wolf Electric Tools, Limited, Hanger Lane, London, W.5. The introduction of this machine will enable users to perform ¼-in. (high speed), and ½-in. (low speed) drilling operations in metal at the correct cutting speeds and with the minimum of effort. One advantage claimed with this machine with its dual-function is that when drilling deep ½-in. dia. holes in hard materials, extremely high penetration speeds can be obtained by drilling a ¼-in. dia. pilot hole before boring out to the required diameter. For hardwood the drilling capacities are higher, namely 1-in. dia. on the low, and ⅝-in. dia. on the high speed. A further feature of this new machine is that the switch-handle is fitted with specially moulded-insulation, thus conforming to International requirements. The gearbox assembly incorporates a selector mechanism and the transmission is such that the gears are in constant mesh, speed selection being obtained by the engagement of clutches integral with the final-spindle gear-wheels. This selection is easily performed by operating a plunger located on the outside of the gearbox, a simple push/pull movement giving the required speed.

High-frequency Electric Portable-tools

It is announced that Johnson & Hartley, Limited, of Mottram Street, Stockport, are appointed sole distributors in UK for the AEG range of high-frequency portable-tools for a number of foundry applications. These utilize a three-phase supply of higher than mains frequency—usually 200 cycles per sec. operating at 125 v. Constant speed is maintained at varying load thus allowing the h.f. motor full utilization of the maximum-admissable peripheral-speed, of a grinding wheel for instance, which makes this tool particularly suited for such operations. The h.f. motor has no revolving armature-winding, no commutator and no brushes and thus maintenance should be low; it can be used with suitable existing convertors. The AEG range includes polisher, grinders, screwdriver, drilling machines, fettling tools.

Powder Fire-extinguisher

The production of a dry-powder fire-extinguisher is announced by Nu-Swift, Limited, of Elland, Yorkshire. The extinguisher consists of a pressure-body loaded with a finely milled powder, and a carbon-dioxide container; activation is by means of a "strike knob," the carbon-dioxide stream carries a dense mass of the particles to the seat of the fire. It is claimed that the apparatus will discharge a cloud of the powder 4 ft. by 2 ft. 6 in., at a range of 10 ft., and will operate at temperatures as low as −40 deg. C. It is most suitable for class B and C fires, *i.e.* inflammable liquids such as petrol, oils, alcohols, varnishes and organic solvents, and electrical equipment and motor vehicles. The equipment which weighs, 10½ lb., has been approved by the Fire Officers' Committee (Ref. 104/8).

ETHER, LIMITED, of Tyburn Road, Erdington, announce that following the undoubted success it has had with the Transitrol Type 994 programme temperature-controller, which has proved to be a boon for controlling the heating and cooling cycle of furnace loads, the firm are now about to market an entirely new range of solenoid valves which, they are confident, will be equally successful.

E. BOYDELL & COMPANY, LIMITED, Old Trafford, Manchester, 16, announce changes in the design of the Muir-Hill 2-WL hydraulic loader, and it is now available with six different buckets ranging from the standard 1-cub. yd. 4-ft. 6-in. wide bucket to an over-size 3-cub. yd. nominal capacity full-width bucket for coke loading, and including ¼-cub. yd. quarry-type buckets, and a 1½-cub. yd. full-width light materials bucket. The redesigned linkage incorporates oil-less bushes and provides ample driver controlled and/or automatic roll-back action. The tipping angle is also increased, positive bucket stops being provided at all tipping heights over 6 ft. 9 in. to tipped bucket lip to ensure positive discharge. The solid beam to frame and bucket to beam linkage is, however, still in production and available for those jobs for which it is most suitable.

Henry Balfour Expansion

The expansion of Henry Balfour & Company, Limited, Leven, Scotland, involves the establishment of new laboratories for research and development of chemical engineering plant. For this purpose the company has decided to purchase a site of approximately 25 acres, close to their existing works. The arrangement of the initial holding will be designed to co-ordinate current development projects and the housing of equipment from several existing laboratories within the group. A staff of qualified chemists and chemical engineers, already operating in existing laboratories, will be engaged in research, and this staff will be augmented to take care of the greater range of work which it is anticipated will be undertaken.

The main bay will contain a comprehensive range of pilot plant and equipment for the processing of materials from which reliable design data can be obtained in the fields of evaporation, drying, distillation, absorption, size reduction, heat transfer, fluid flow, dust recovery, filtration, carbonization, electrolysis, dispersion, mixing, agitation and general chemical reactions. Special attention will be paid to materials of construction, and separate laboratories for corrosion, mechanical testing, chemical analysis, physical chemistry, metallurgy, and radiographic examination are being installed. In addition to 35,000 sq. ft. of laboratory and pilot plant space equipped with overhead cranes and all services, there will be conference rooms, library facilities, drawing and design offices, and a separate building for inflammable solvents, noxious gases and ionizing radiations. New developments reflecting the latest advances in physical and chemical science are being planned.

In conjunction with this expansion, a scheme has been launched for the training of technical personnel in chemical and mechanical engineering, and chemical spheres. A five to six years' student apprenticeship plan is envisaged which will enable suitably-qualified young men and women to reach full professional status and, at the same time, obtain valuable practical training in industry, especially in the design and operation of a wide range of scientific process equipment.

Old Methods—New Products

Methods of art casting in bronze used to-day are the same as those used by the Chinese about five thousand years ago, Mr. E. C. Barker, director of a city foundry, told Coventry Rotarians recently. "It is the oldest craft which still uses the original methods," he said. "I think the foundryman's art is just as great as that of the artist who moulds the clay, because while a mistake with clay can be rectified a mistake in casting cannot."

He detailed the method of producing bronze castings, illustrating his talk with castings made by his father and by himself, "It is a very slow and costly process, because time is to-day a price cost," he said. "This sort of work cannot be rushed. There is no mass production about it, an artist like Epstein, for example, would not even use a mechanical brush to finish a bronze. He would prefer to use the old hand brushes."

Mr. Barker pointed out that the process used in bronze casting was now being used extensively in industry for small intricate castings, an aspect that had been developed in America, but was being used a great deal in this country as well. Answering questions, he said that a head by a famous sculptor might cost about £500, and one by an unknown artist about £150.

Turbine Shares Offer

No difficulty is foreseen in raising such finance as may be necessary for the long-term programme of improvements and enlargements to works, plant, and equipment by Richardsons, Westgarth & Company, Limited. The directors state that, in connection with the formal offer now made to acquire the shares of Parsons Marine Turbine Company, Limited, the order-book is at record level and the group's works are likely to be satisfactorily employed for several years ahead. They expect to pay a final dividend of 6d. per 5s. unit, making 10d. per unit for the year to March 31, 1957, as for each of the two preceding years.

The offer, as reported in the JOURNAL of March 28 (p. 388), is on a share exchange basis of 11 units of Richardsons, Westgarth for two Parsons Marine £1 shares. The shares resulting from this offer do not rank for the 1956-57 dividend. Parsons Marine shareholders will receive a further dividend of 12 per cent., making 15 per cent. for the nine months to March 31, corresponding to 20 per cent. for each of the three previous years.

The offer will remain open until April 27 and is conditional upon acceptance by holders of 90 per cent. of the Parsons Marine capital, of such smaller percentage (not less than 75 per cent.) as Richardsons, Westgarth may accept. The Parsons Marine board recommends acceptance of the offer.

Technologists in Demand

Industrialists are queuing up for young men with scientific and technological qualifications, says the annual report of the Royal College of Science and Technology, Glasgow. However, the Department of Natural Philosophy reports that only 14 students completed the course in applied physics.

The Department of Chemistry states that whilst the number of students following courses had not changed appreciably, the demand by industry for graduates is still increasing and, indeed, is assuming "embarrassing proportions." In the Department of Mechanical and Civil and Chemical Engineering the competition from industry for all classes of engineers is becoming even more intense. The Department points out that the general distribution of men to industry has been rather thrown out of balance by the fact that certain sections, notably the aircraft firms and the Atomic Energy Authority, can offer complete deferment from military service.

Ore Sintering Convention

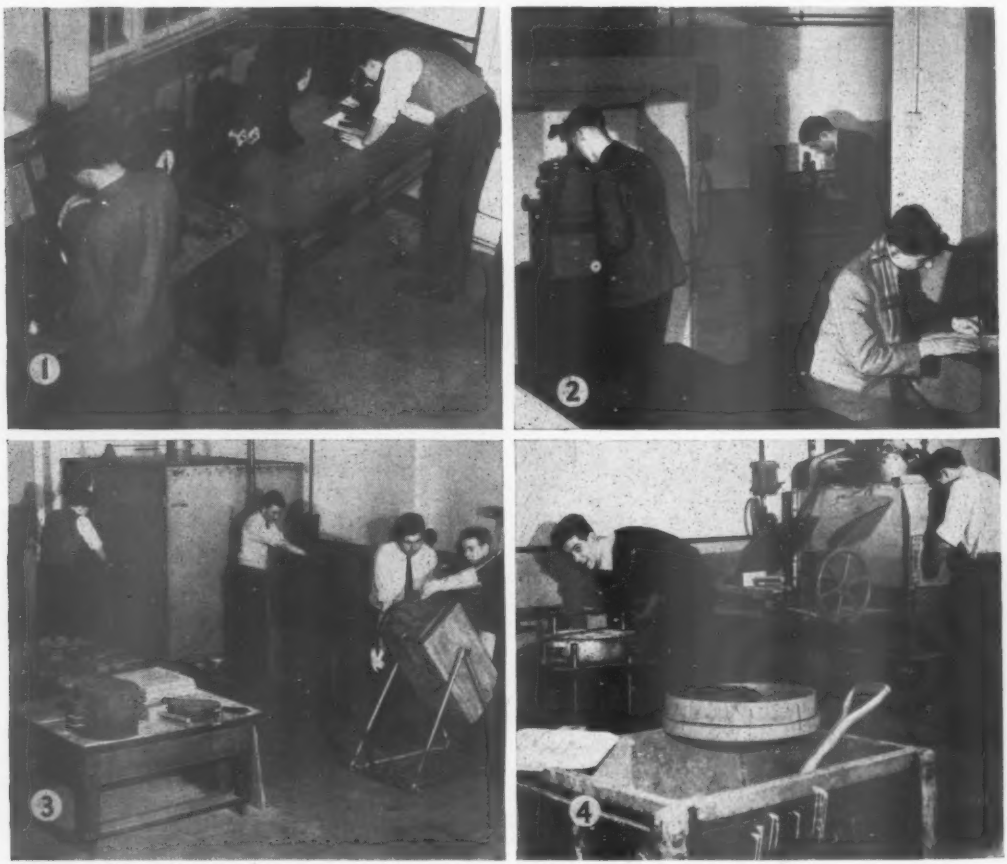
An international convention on "Iron-ore Sintering" has been organized by the *Institut de Recherches de la Siderurgie* (IRSID) and the *Chambre Syndicale de la Siderurgie Française* to be held in Paris from May 21-23. The technical sessions will take place in Maison de la Chimie, 28 Rue St-Dominique, Paris, and the discussions will be simultaneously translated into French, English and German. The programme will be as follows:—*First day:* "Mechanism of Bed Sintering"; *second day:* "Processes of Iron-ore Sintering" and *third day:* "Use of Sinters in Blast-furnace Practice." Further information about the conference and attendance forms can be obtained from Mr. Allard of IRSID at 185 rue President Roosevelt, St. Germain-en-Laye (S & O), France.

New Foundry Laboratories at the Borough Polytechnic, in London

The Borough Polytechnic provides a four-year part-time day course of technical education for foundry apprentices, which covers the examination syllabus of the City and Guilds of London Institute. The interpretation of this syllabus requires that the student spends approximately a quarter of his course having laboratory instruction where experiments on correct and incorrect techniques with moulds, cores and alloys are carried out. Until recently this practical work had to be conducted in a small workshop in the Polytechnic annexe. During last session, however, as a result of extensions and war-damage repairs, it became possible to house the foundry in the ground floor of the main building of the Polytechnic, where more spacious accommodation (Figs. 1 to 7) is available and which allows the equipment on hand to be used to more advantage.

The plan (Fig. 7) shows the new laboratory layout, which for the purpose of identification is divided into four sections, A to D. The foundry, section A (Figs. 3 and 4), is devoted to sand preparation, coremaking, bench, floor, pit, machine and shell moulding with an area available for casting the moulds (Fig. 6). Provision is also made for fettling, gravity-die-

FIGS. 1 *to* 4.—*Students working in the foundry section of the Borough Polytechnic, London.* FIG. 1 *Sand testing;* FIG. 2 *Microscope room;* FIGS. 3 *and* 4 *two views of the casting bay.*



casting and for core and mould drying in a stove of 125 cub. ft. capacity. The sand-pit, sited centrally in the moulding floor is 5 ft. sq. by 2 ft. deep, is used for producing open-cast moulds, grids, bedded-in moulds, and small loam moulds. It is fitted with a wood cover when not in use. Section B contains the main melting equipment, a 10-cwt. per hr. cupola (Fig. 5), and a 50-lb. (brass) capacity gas-fired "lift-out" crucible furnace employed mainly for non-ferrous melts. Section C is the foundry laboratory (Fig. 1), fully equipped for sand testing, metal patternmaking, the heat-treatment and inspection of castings and steel melting for investment casting in a 5-lb. capacity high-frequency electric furnace. Section D is the physical metallurgy laboratory (Fig. 2) which is fitted with 15 bench microscopes, A Vickers projection-microscope and the ancillary equipment for specimen preparation, a specimen mounting press and polishing machines.

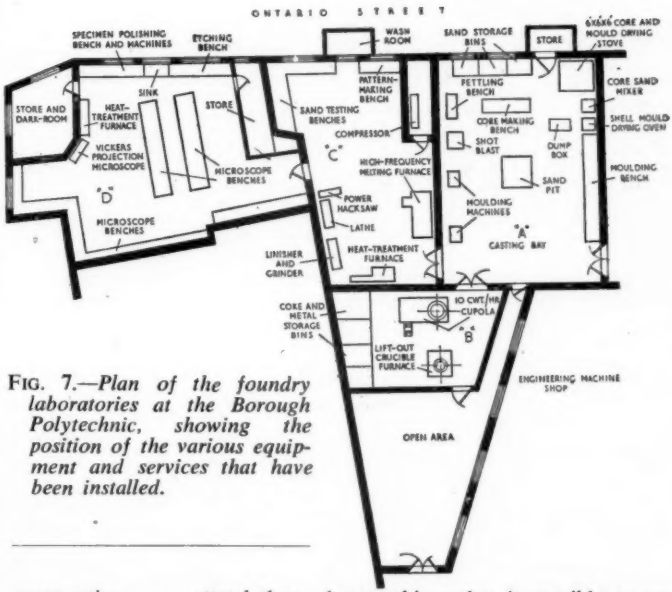


FIG. 7.—*Plan of the foundry laboratories at the Borough Polytechnic, showing the position of the various equipment and services that have been installed.*

Strength of materials, heat-treatment, and fuel-testing laboratories are also available for the use of foundry students in the ground floor of the main building. The foundry and its associated laboratories are mainly used in the training of foundry apprentices for the City and Guilds of London certificate. It is now the standard practice of firms to release apprentices for one day per week to attend these classes; this makes it possible to use the accommodation and equipment in the evening for any additional courses which may be of use to others connected with the industry. During last session a special course of foundry science for technical sales representatives was held one evening per week, much of the work being done by demonstration and experiment. This venture proved very successful and it is intended to offer a similar course next session.

FIGS. 5 *and* 6.—*Students tapping iron melted in the* 10-*cwt. per hr. cupola, and pouring a casting of brass melted in a* 50-*lb. capacity lift-out crucible furnace, situated in the melting section* ("*B*"—*Fig.* 7).

Publications Received

Steel Castings for Rolling Mill Plant and Ancillary Equipment. Issued by the British Steel Founders' Association, Broomgrove Lodge, Broomgrove Road, Sheffield, 10.

The provision by steelfounders of castings for steel works, and especially for rolling mills, ranks high in the weight range of their production. This bulletin carries two illustrations of housings weighing 80 and 100 tons. The story of just what rolling mills do and how they do it is told interestingly, and serves to illustrate how capital expenditure of this character produces prodigious quantities of goods capable of materially altering national production statistics. This well-written and well-illustrated publication maintains the standard that this series of booklets has set for itself.

Induction and Di-electric Heating, being No. 6 of the "Electricity and Productivity" series issued by the British Electrical Development Association, 2, Savoy Hill, London, W.C.2; price 9s. post free.

There is quite a considerable interest for foundrymen in this 190-page book, which opens with a lengthy section on induction melting procedures. Here the applications dealt with are numerous and not the least important is their use in die-casting practice. High-frequency plant is entered into in some detail, and the chapter terminates with notes on melting under vacuum conditions. Part II covers the heat-treatment of an extremely wide range of engineering components and a very large number of these are illustrated; in the complete book there are no fewer than 154 photographs. Part III entitled "Di-electric Heating" has one chapter of interest to patternmakers, as the glueing of wooden components is dealt with, whilst in the last chapter foundry applications come up for consideration. Here the baking of oil-sand cores and resin-bonded shell moulds are described and illustrated.

House Organs

Foseco Foundry Practice, No. 127; issued by Foundry Services, Limited, Long Acre, Nechells, Birmingham, 7.

This issue carries a front-page story of a defect in a gunmetal casting which terminates with the sound advice to avoid turbulence when casting and the necessity of ensuring correct composition. The company's very successful "Open Week" is recalled in an interesting article.

Wild Barfield Heat-treatment Journal, Vol. VI, No. 20. Elecfurn Works, Watford By-pass, Herts.

In this issue some useful hints are given as to the care to be taken when using the Spekker photo-electric absorptiometer. A second article covers the "Five-Twenty" thermocouple for high-temperature applications.

Aluminium News, March 1957; distributed by the Northern Aluminium Company, Limited, Bush House, Aldwych, London, W.C.2.

Four pages of this issue are printed in aluminium foil which has been lacquered. This, together with the use of the lithographic printing process, has produced some striking colour effects.

Malleable Iron Facts, No. 55; published by the Malleable Founders' Society, 1800 Union Commerce Building, Cleveland, 14, Ohio.

This issue goes back to basic principles and illustrates malleability, and its associated properties of impact resistance and machinability. A complicated malleable gear-housing casting is illustrated and described.

New Catalogues

Cold Coating Resin. In Information Sheet No. F101, issued by British Resin Products, Limited, Devonshire House, Piccadilly, London, W.1, a new resin, Cellobond JX.5040, for cold coating sand for blown cores and shell moulds, is described in much interesting detail. Information is given as to choice of sand; milling of the sand when using well-known types of mixers; pattern lubrication; investment time; and the actual making of shell moulds. In the latter, a useful table is printed correlating time of dwell with section thickness. The final section is devoted to the making of cores by either dumping or blowing, information being given as to resin content (3 per cent.); working temperature (180 to 220 deg. C.) and the properties of the cores. A graph is reproduced showing the transverse strength related to the quantity of liquid resin added. This information sheet is available to readers on writing to Devonshire House.

High-vacuum Technology. Fleischmann (London), Limited, 16, Northumberland Avenue, London. W.C.2, having been appointed sole agents for W. C. Heraeus G.m.b.H., Hanau, Western Germany, have issued a 56-page brochure in which two-colour printing has been used throughout. The book is divided into eight sections which cover high-vacuum pumps; vacuum gauges; coating plants; vacuum metallurgical plants; electron-gun components; and graphs and charts. Those who are tackling the production of titanium castings should certainly study the vacuum-electric furnace section as it shows a type of plant which has been developed so as to be capable of tackling 2-ton melts. Those interested should write to Northumberland Avenue for a copy of the brochure.

Die, Mould and Core Dressings (and Fluxes). Carrying the general trade mark Surfex, an eight-page booklet issued by the Harborough Construction Company, Limited, Market Harborough, deals with numerous—actually 25—dressings which the company markets for use with die-casting and sand-moulding of both ferrous and non-ferrous metals. Of increasing interest are the chill-throwing dressings; the use of these is confined, of course, to iron castings, since the "chill" is induced by surface alloying. A second four-page leaflet has also been released to cover a line of fluxes specially compounded for users of the Sklenar range of furnaces.

Industrial Electronic Equipment. A 12-page well-illustrated brochure received from Lancashire Dynamo Electronic Products, Limited, Rugeley, Staffs, shows, without too much technical detail, the wide range of equipment which the company manufactures to enable firms to apply automatic control to industrial processes. The range includes photo-electric installations, smoke-density indicators and alarms, lighting control, process variables recorders, temperature controls, to mention but a few. This interesting brochure is available to readers on writing to Rugeley.

Conveyor Belt-splicing Service. An illustrated leaflet published by the British Tyre & Rubber Company, Limited, of Herga House, Vincent Square, London, S.W.1, sets out the advantages of vulcanizing belts on-site and shows how, by using BTR Tylock splices, straight and trouble-free running of conveyors can be achieved with little or no interference to output. The leaflet is available to readers on writing to Herga House.

Some Points on Patents

by "Barrister-at-Law"

Letters Patent are granted by the Crown, and they purport to grant to the patentee "the *whole* profit and advantage from time to time accruing by reason of the said invention." Having regard to this wording, it is, perhaps, not surprising that the layman should wonder why he should have to pay any tax at all, whether the "profit" he receives from his invention comes to him in the shape of royalties for the use of his patent, or in the shape of the sale price of the patent where it is sold outright.

This point was raised in 1944 in the case of *Kirke v. I.R.* (1942) 26 T.C. 208, by a consulting engineer who had made a number of inventions. Under a deed made in January, 1934, he granted to a company the exclusive licence to use, exercise, and sell, certain apparatus and methods under his inventions, the consideration for the grant being the payment of royalties which were to be calculated by reference to the number of articles sold. The taxpayer was assessed to surtax for the year ending April 5, 1942, in respect of a sum of £11,592 which he had received on account of royalties under the terms of the licence he had granted.

Royalties Subject to Tax Deduction

Now the Income Tax Acts have prescribed, ever since their introduction in 1842, that patent royalties shall be charged to tax by deduction at the source. The grantee of the licence accordingly deducts tax at the standard rate from the royalties payable by him, and pays over the balance to the grantor. The present statutory provision governing this matter is to be found in S.169 (3) (a) of the Income Tax Act, 1952, which replaces General Rule 19 of the Income Tax Act 1918 as amended by S.39 (1) of the Finance Act, 1927.

What the taxpayer was contending, therefore, in the case in question was that, because the Crown was purporting to grant him, by the terms of the Letters Patent, the "whole profit and advantage" accruing by reason of the invention, therefore that overrode whatever any statute might say on the matter. It is a constitutional principle, however, that the law can only be made by the Crown *in Parliament*, and the Crown accordingly, by itself, cannot abrogate in any way from the law as made by Parliament and assented to, formally, by the Crown.

Indeed S.213 of the Income Tax Act, 1918 (which is now reproduced in S.512 of the Income Tax Act, 1952), expressly provided that *no* letters patent granted *by the Crown* to any person free of any taxes, deductions or assessments was to be construed or taken to exempt that person from income tax; all provisions to the contrary in such letters patent were to be void.

The letters patent, in the above case, even though they might have been construed as impliedly meaning that the profits from the invention were to be tax free, accordingly would have been completely ineffective to confer such an exemption from the general law on the grantee.

New Phrasing

It is significant, however, that under the Patents Act of 1949, patents for the first time were granted "subject to the conditions and provisions prescribed by any statute or order for the time being," and it looks very much that the introduction of these words in the form of the grant was intended to meet the difficulty raised by the case of *Kirke*. But in a later case, in which the same taxpayer was the appellant, the Court took the view that the new phrasing in the form of the grant of Letters Patent was introduced merely by the way of caution and possibly because of the point taken in 1942 by the same taxpayer.

In the second appeal, *Kirke v. Good* (1955) 36 T.C. 309, the taxpayer had his patents (referred to above) extended until 1954, pursuant to the war time regulations then in force, and he sold his rights for the last 2 years of the patent out-and-out for a capital sum.

Capital Sums Tax

Now it is to be noted that in 1945, the Income Tax Act of that year introduced new rules which had the effect of taxing capital sums paid for the sale of patents. Had the taxpayer sold his patent rights before 1945, it seems that the sums received by him on the sale would have been capital sums which would not have been taxable. The taxpayer accordingly contended that the new rules taxing capital payments for sales of patent rights introduced by the Act of 1945 should not be applied to patents granted before the passing of that Act, since otherwise the legislation would have a retrospective operation.

The Court, however, rejected all these arguments and held that the capital sums, though received in respect of a patent granted before 1945, fell to be taxed under S.37 of the Income Tax Act, 1945, which is now re-enacted in S.318 of the Income Tax Act, 1952.

Under this provision the capital sum is apportioned over the six years beginning with the year in which it is first received, and each one-sixth is assessed in each of the respective six years.

The taxpayer, however, enjoys the option of having the whole sum taxed for the year of assessment in which it is received without any apportionment. For this purpose, however, he must give written notice to the Surveyor of Taxes not later than 12 months after the end of the year of assessment in which the sum was received.

Company News

ROYLES, LIMITED, engineers and foundrymen, etc., of Irlam (Lancs)—Trading profit for 1956 is £91,899 (£75,619). To the final dividend of 14 (11) per cent. is added a bonus of 3 per cent. out of investment income (same), making 20 (17) per cent.

B. O. MORRIS, LIMITED, flexible shaft and grinding machine manufacturers, of Coventry—The company announces the acquisition of the issued capital of Stewart King Industries, Limited, manufacturers of air-conditioning and temperature control equipment.

TONKS (BIRMINGHAM), LIMITED, general brassfounders, etc.—Applications for the 400,000 5s. ordinary shares at 6s. 3d. totalled 3,441 for 3,270,800 shares. Basis of allotment ranges from 50 shares for applications for 100 to 300, to 5 per cent. for applications of 13,000 and over.

TUBE INVESTMENTS, LIMITED—The £7,500,000 issue in 5¼ per cent. unsecured loan stock, 1977-82, was taken by the preference and ordinary holders (to whom it was offered) to the extent of £2,420,000 or 32.27 per cent. Underwriters have been required to take up the remainder.

C. A. PARSONS & COMPANY, LIMITED—Newcastle-upon-Tyne—A final dividend of 3¼ per cent. on £9,000,000 ordinary is announced. The interim was 4¼ per cent. on £3,600,000 prior to a 50 per cent. scrip issue and a one-for-one rights issue. Net profit of £2,293,364 compares with £1,962,613.

GLOVER & MAIN, LIMITED, gas engineers, of London, S.W.1—Group profits fell from £545,580 to £217,552 before tax and from £262,879 to £86,679 after tax. Final dividend is being cut from 11¼ per cent. to 8¼ per cent., making, with the reduced interim, 10 (13¼) per cent. for 1956 on the £1,202,814 ordinary.

G. & J. WEIR, LIMITED, engineers and founders, of Glasgow—The directors propose to capitalize £2,018,307 of reserves for a one-for-one scrip issue. If CIC consent is granted, an extra-ordinary meeting will be held in the autumn to effect the proposals. It is added that no interference with regard to future dividend policy should be drawn from the proposed capital increase. The dividend is held at 30 per cent. with a final of 22¼ per cent.

GARDINER SONS & COMPANY, LIMITED, engineers, of Bristol—The next stage of the financial arrangements to be made by the company involves issuing ordinary shares, but the size and the date of any issue is difficult to determine until proceeds of the sale of these properties are known. It is not likely that such information will become available before next autumn and possibly not until midsummer, 1958. Net profits in 1956 totalled £69,428 (£55, 567), and the dividend is raised from 10 per cent. to 11 per cent.

SWITCHGEAR & COWANS, LIMITED—Apart from a railway contract already known, no major increase in demand for the company's product is expected while financial restrictions exist. It is proposed to utilize the proceeds of the recent rights issue in buildings and plant to manufacture more cheaply and efficiently. The difficult conditions of 1956 still obtain and labour troubles could seriously impair the results for 1957. Group revenue balance is £225,520 (£213,975), and the dividend is repeated at 25 per cent., of which the 15 per cent. final is on the enlarged capital.

PRESSED STEEL COMPANY, LIMITED—The offer of £2,000,000 5¼ per cent. convertible debenture stock, 1977-82, to ordinary and preference holders attracted applications for over £22,000,000. For amounts less than £10,000 from ordinary stockholders the allotment is in full up to £350; over £350 and up to £10,000, there is a basic allotment of £350 plus 12 per cent. of the balance. Preference holders get a basic allotment of £200 and 12 per cent. of the balance up to £10,000. The amount of ordinary and/or preference stock held governs allotments for applications of over £10,000.

ENFIELD ROLLING MILLS, LIMITED—Substantial profits owing to rises in metal prices in 1955 were not repeated in 1956, but there were no stock losses despite the fall in metal prices. Group trading profit contracted from £2,139,522 to £1,553,888, and the net profit is down from £938,465 to £531,474. A final dividend of 10 per cent. on a capital doubled to £3,110,000 by a scrip issue represents a total equal to 12½ per cent. on the present capital, an effective increase of 1¼ per cent. over 1955. The 5 per cent. interim was paid prior to the 100 per cent. scrip issue.

STEEL & COMPANY, LIMITED, engineers, etc., of Sunderland—The group's total volume of business to date is greater than ever before and the order-book is still in a very satisfactory state. In the manufacturing companies, plans are near fruition to increase productive capacity. The chairman, Mr. James Steel, in an interim report, says the group was already competing successfully with Continental manufacturers and if Britain decided to remain outside the European Common Market, the group's German factory would be well placed to take full advantage of the extended sales.

A. REYROLLE & COMPANY, LIMITED, manufacturing electrical engineers, of Hebburn (Co. Durham)—The value of orders received in 1956 was substantially higher than ever before recorded, and output established another record. It was not possible completely to offset rising costs, and trading margins, satisfactory under present conditions, were not so high as in recent years. Group trading profits amounted to £2,587,436 (£3,681,406). The final dividend is 11 per cent. on increased £4,579,411 ordinary—the interim of 6½ per cent. and the 1955 total of 16½ per cent. were on £3,052,941.

PARKINSON & COWAN, LIMITED—The company achieved a record turnover in 1956 when consolidated net profits of £171,536 compared with a previous loss of £35,456. The dividend was 9 per cent., against 5 per cent. Mr. H. P. Barker, the chairman, points out that the cash position has much improved. Indebtedness to bankers, which was £390,000 at the end of 1955, was converted to a credit balance of £68,000 a year later. A proportion of outside investments has been liquidated, but the balance of £64,585 (£101,964) had a market value of £167,332 at December 31 last. While 1957 has started well and a sound year's trading is expected, the company warns members that there are signs in some directions of a tightening of business.

WESTINGHOUSE BRAKE & SIGNAL COMPANY, LIMITED—An offer by way of rights to ordinary shareholders registered on April 1 of 1,777,356 £1 ordinary shares on a two-for-three basis is being made. The Consolidated Signal Company, Limited's entitlement to a provisional allotment of 263,666 shares in respect of its holding of £395,500 Westinghouse ordinary is being passed direct to Consolidated ordinary holders on the basis of seven Westinghouse ordinary for every £4 Consolidated ordinary. Net proceeds (about £3,035,000) will be used to fund the balance of the group's debt to bankers, (about £2,415,000) to increase productive capacity, and to provide more working capital. Current year results should allow a dividend of not less than 9 per cent. comparable with 18 per cent. on previous capital.

Factory Equipment Exhibition

The fifth Factory Equipment Exhibition, which will be held at Earls Court from April 29 to May 4, is to be opened by the Rt. Hon. Iain Macleod, M.P., Minister of Labour and National Service at 11 a.m. on Monday, April 29. Exhibits will include fuel-economy equipment, steam-raising and handling plant and machines, storage and office equipment, engineering plant and protective clothing. Brief descriptions of exhibits having an interest for founders are given below.

McKECHNIE BROTHERS, LIMITED, are incorporating in their display this year, electrolytic-copper powder and lithophone in addition to their wide range of powders manufactured for industrial purposes. *Stand D500*

RILEY PRODUCTS, LIMITED, will show a range of their mechanical coal-stokers together with their G and F oil burners and Syntron electric-vibratory equipment for handling loose bulk materials. *Stand D.22*

JOY-SULLIVAN, LIMITED, will exhibit the Limberoller conveyor idler which shapes itself to the load being carried by the belt; the idler is manufactured from neoprene-covered steel-wire cable and is fitted with sealed precision ball-bearings.

G. A. HARVEY & COMPANY (LONDON), LIMITED, are featuring storage racks, bins and shelving together with the firm's range of office equipment including filing cabinets, desks and a comprehensive range of wirework. *Stand D.48.*

NUCLEAR ENGINEERING, LIMITED, are exhibiting shielding and handling equipment for radioactive isotopes used in radiography of welds, castings and assemblies. *Stand D.22.*

THE MAIN FEATURE of the oil-fuel centre will be the 20,000 sq. ft. two-storey stand of Shell Mex and B.P., Limited. Grouped round this central stand will be the displays of 23 of the leading manufacturers of oil-burning equipment including: Clyde Fuel Systems, Limited; Laidlaw, Drew & Company, Limited; Nu-Way Heating Plants, Limited; Allied Ironfounders, Limited; J. Brockhouse & Company, Limited; Joseph Lucas (Hydraulic & Combustion Equipment), Limited, and John I. Thorneycroft & Company, Limited.

AIRMEC, LIMITED, will demonstrate their complete range of industrial electronic-control and measuring equipment, including the industrial photo-cell counting equipment.

THE GAS COUNCIL will exhibit displays concerning the utilization of gas for industrial purposes, and includes water and space heating and catering.

AEROGRAPH COMPANY, LIMITED, are to demonstrate a water-wash spray-booth in operation, and a transverse automatic spray-coating machine illustrating how mass produced articles can be finished at a high speed.

Continuous Casting Company, Limited

The Continuous Casting Company, Limited, Netherby, Weybridge, announces its association with the Davy & United Engineering Company, Limited, and Newton, Chambers & Company, Limited.

Sir Peter Roberts, chairman, and Mr. K. E. Walker, assistant managing director, of Newton, Chambers & Company, and Mr. M. A. Fiennes, managing director, and Mr. M. F. Dowding, engineering sales manager, of the Davy & United Engineering Company, have joined the board of the Continuous Casting Company, Limited.

New Patents

(Copies of complete specifications are obtainable from the Patent Office, Sales Branch, 25, Southampton Buildings, Chancery Lane, London, W.C.2, price 3s.)

768,276. Societe D'Inventions Aeronautiques et Mecaniques, S.I.A.M., 1 Route des Alpes, Fribourg, Switzerland.

Magnesium-base alloys containing aluminium 0.4 to 0.6, beryllium 0.008 to 0.012, silicon up to 0.15 per cent; no manganese is included. It also contains zinc 6 to 7, substantially pure lanthanum 0.5 to 1.5 per cent., or zinc 5 to 7, and didymium 0.5 to 2 per cent., the balance of these alloys is magnesium.

768,887. Ford Motor Company, Limited, 88, Regent Street, London,W.1.

Production of resinous materials from reactive mixtures of liquid furane derivatives and maleic acid or the anhydride of maleic acid (or both). The controllable initiation of the rapid resinification reaction is employed in a process for producing resin-bonded aggregates of particulate matter such as foundry shell-moulds.

769,129. H. A. Fromson, Rogues Ridge Road, Weston, Connecticut, USA.

A method for the casting of sheets of metal in a liquid mould, *e.g.* molten lead, or molten barium chloride.

769,296. D.C.B. Limited, 178 to 202, Great Portland Street, London, W.1.

A method of die-casting in a suitable tin-alloy the tips of ball-point pens, to improve dimensional accuracy and better wear-resisting qualities.

769,464. Deutsche Edelstahlwerke, A.G., 578, Gladbacherstrasse, Krefeld, Germany.

A steel suitable for producing articles which are chromized by way of the halogen compound of the chromium. It consists of carbon less than 0.2, one or more of titanium, tantalum and niobium, in a quantity sufficient to bind the entire carbon content in a stable manner, and copper 1.0 to 2.5 per cent. The remainder is iron, save for impurities. Optional incidental constituents such as manganese and silicon may also be present, but should not exceed 1.5 per cent.

769,483/4/5. Willi Neu, 237, Mainzerstrasse, Saarbrucken, The Saar.

769,483. Zinc/aluminium alloys and process for their production. They consist essentially of aluminium 20, silicon 0.1 to 15, copper 0.05 to 6 per cent. The remainder is zinc, present as at least 20 per cent. **769,484.** This patents refers to bearing and other components exposed in use to sliding surface friction, and which can effectively be made from the alloys mentioned in 769,483. **769,485** also refers to a zinc/aluminium alloy, but this has a composition of aluminium 30 to 60, and boron 0.001 to 15 per cent. The remainder is zinc which should be present as at least 20 per cent., and preferably not less than 30 per cent. of the alloy.

769,529. R. Daub, West Caldwell, New Jersey, USA.

Improvements in, and relating to, the manufacture of pistons with the object of providing a piston with high heat conductivity and durable in service. (Patent No. 769,528 also refers to piston structures by the same inventor).

Imports and Exports of Iron and Steel in February

The following tables, based on Board of Trade returns give figures of imports and exports of iron and steel in February. Totals for the first two months of this year and last are also included.

Total Exports of Iron and Steel

Destination.	Month ended Feb. 28.	Two months ended February 28.	
	1957.	1956.	1957.
	Tons.	Tons.	Tons.
Channel Islands	159	1,174	537
Cyprus	679	431	1,386
Sierra Leone	1,824	889	2,938
Gold Coast	1,032	3,881	3,316
Nigeria	5,911	11,172	9,726
Union of South Africa	11,463	17,809	17,311
Rhodesia and Nyasaland	5,036	7,737	12,052
Tanganyika	1,340	2,596	4,340
Kenya	2,377	7,813	6,243
Uganda	102	1,524	788
Mauritius	294	227	662
Aden	623	1,078	831
Bahrein, Qatar, and Trucial States	1,446	1,848	1,577
Kuwait	4,383	266	4,826
India	33,969	54,884	54,849
Pakistan	3,755	10,101	5,758
Singapore	4,748	5,214	8,164
Malaya	4,845	4,837	8,126
Ceylon	2,742	4,286	5,529
British North Borneo	469	1,261	548
Hongkong	12,450	8,766	23,198
Australia	20,406	40,830	38,100
New Zealand	8,671	34,370	22,828
Canada	21,290	33,926	34,037
Jamaica	1,368	4,415	2,314
Trinidad	2,391	6,710	5,777
British Guiana	511	776	824
Other Commonwealth countries	3,623	3,632	5,607
Eire	3,812	11,053	7,699
Finland	8,701	7,851	15,280
Sweden	8,921	20,649	16,749
Norway	7,577	14,289	19,362
Denmark	10,730	9,654	17,725
Western Germany	1,498	2,520	4,736
Netherlands	11,702	14,387	20,528
Belgium	3,780	4,997	5,932
France	2,257	1,403	3,368
Switzerland	2,247	2,455	4,086
Portugal	1,767	1,219	3,268
Spain	3,483	2,790	5,246
Italy	2,885	3,610	12,130
Austria	242	877	577
Yugoslavia	34	1,167	777
Greece	746	1,199	1,257
Turkey	1,518	748	1,590
Netherlands Antilles	335	1,667	1,083
Portuguese East Africa	354	592	631
Egypt	—	6,930	—
Sudan	2,111	3,909	5,375
Lebanon	363	1,626	522
Israel	233	1,280	609
Saudi Arabia	1,166	1,930	1,257
Iraq	3,338	6,209	5,381
Iran	7,313	13,021	7,888
Burma	975	707	2,639
Thailand	321	2,063	939
Indonesia	242	1,723	479
Philippine Republic	29	556	151
USA	2,103	6,882	5,908
Cuba	358	1,990	712
Colombia	485	384	646
Venezuela	3,415	9,832	12,084
Ecuador	190	520	518
Peru	647	3,803	1,468
Uruguay	687	708	1,262
Argentina	5,158	7,737	10,612
Other foreign countries	14,424	3,992	31,912
TOTAL	274,054	451,382	514,578

Total Imports of Iron and Steel

From	Month ended Feb. 28.	Two months ended February 28.	
	1957.	1956.	1957.
	Tons.	Tons.	Tons.
Rhodesia and Nyasaland	258	444	623
Canada	2,388	9,183	5,749
Other Commonwealth countries and Eire	1,360	1,321	3,501
Soviet Union	16,623	60,401	29,476
Sweden	2,835	7,404	6,184
Norway	11,717	20,923	21,420
Western Germany	8,201	35,059	18,999
Netherlands	7,966	23,903	13,342
Belgium	15,716	77,439	30,699
Luxembourg	4,261	15,740	8,149
France	7,259	65,206	16,830
Italy	382	1,865	614
Austria	5,704	32,604	19,508
Japan	548	3,578	3,152
USA	20,345	101,952	23,472
Other foreign countries	2,520	9,700	9,714
TOTAL	108,083	466,722	211,432
Iron and steel scrap and waste, fit only for the recovery of metal	37,587	196,608	96,487

Exports of Iron and Steel, by Products

Product.	Month ended Feb. 28.	Two months ended February 28.	
	1957.	1956.	1957.
	Tons.	Tons.	Tons.
Pig-iron	20,392	15,495	40,744
Ferro-columbium (niobium)	13	28	22
Ferro-tungsten	38	133	149
Other ferro-alloys	317	544	635
Ingots, blooms, billets, slabs, sheets, and tinplate bars	128	569	321
Iron bars, rods, angles, shapes, and sections	61	357	242
Steel bars, rods, angles, sections, and shapes	42,540	67,969	82,982
Iron plates and sheets	13	62	36
Universal plates	433	1,220	563
Steel plates, ⅛ in. and under ¼ in.	941	1,852	1,958
Do., ¼ in. and over	17,598	39,673	31,000
Blacksheets and blackplate	27,522	40,630	55,620
Hoop and strip	7,612	17,159	16,053
Tinplate	34,521	48,531	61,633
Decorated tinplate	323	1,329	601
Galvanized sheets	18,267	22,400	33,530
Other (including tinned sheets, terneplate, and ternesheets)	2,387	2,513	4,320
Railway and tramway construction material	27,965	52,748	45,864
Wire rods	2,420	5,343	6,965
Wire	8,207	16,337	15,902
Tubes, pipes, and fittings	61,111	115,370	113,295
Iron castings	107	261	215
Steel castings	428	262	657
Forgings	710	597	1,271
TOTAL	274,054	451,382	514,578

PEASE & PARTNERS TEES FOUNDRIES, LIMITED, announce that all of the assets and liabilities of the company have been absorbed by Pease & Partners, Limited, its parent company, which holds all its share capital, and the business will in future be carried on under the name of Pease & Partners, Limited.

THE EXCELSIOR FOUNDRY, Sandiacre, owned by the Allied Iron Founders, which was closed a year ago is now to be sold. The factory is one of the oldest in the town, having been built as a starch works in 1885. After being used as an Admiralty store during the last war, it afterwards returned to making castings. About 100 men were employed.

News in Brief

THE RUMANIAN MINISTER, Mr. Corcinschi, accompanied by his commercial secretaries, recently paid a visit to the factory of the A. P. V. Company, Limited, Crawley.

THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge 39, Massachusetts, USA, announce that a special course of lectures is to be given on "Wear Theory" from June 17 to 28.

NORTH BRITISH LOCOMOTIVE COMPANY, LIMITED, Glasgow, have received a contract from the British Transport Commission for ten 1,000 h.p. diesel engines. The engines—for five trains being built for service in 1958—will haul at speeds up to 90 m.p.h.

CRYPTO, LIMITED, a subsidiary of the Lancashire Dynamo Group, has completed the rebuilding of its head office and works on the North Circular road, London, N.W.10. The rebuilding has doubled the previous floor-space. A larger canteen and a new showroom have been provided.

THE IRISH CUSTOMS DUTY on imported iron and steel bars, rods, and sections has been amended in an official Order. The effect of the Order is to exclude from liability to duty certain bars, rods, and sections whose greatest cross-sectional dimension is neither less than $\frac{5}{16}$ in. nor more than $\frac{5}{16}$ in.

THE INCREASING USE of radio-active materials and X-ray equipment in the metallurgical laboratories of the Birmingham College of Technology has resulted in a decision, by the authorities, to appoint a safety officer responsible for the handling of such materials in all departments of the College.

AN ELECTRONIC COMPUTER EXHIBITION, to include data-handling equipment of all kinds, is to be held at Olympia, London, from November 28 to December 4, 1958. Concurrently with the exhibition there will be a symposium at which papers dealing with the applications of computers to problems in business, industry and science will be read and discussed.

SPEAKING at the annual Midland region dinner of the Institution of Production Engineers in Birmingham on April 12, Mr. Alick S. Dick, managing director of the Standard Motor Company, Limited, said that industry to-day was bedevilled by an over abundance of Oliver Twists and that the "vicious spiral" of rising costs and prices unless halted would bring ruin to the nation. The burden of responsibility lay equally with industry, the trade unions and the Government. He went on to say that the recent Budget was a great disappointment to the engineering industry; failure to concede some relief in taxation and especially on capital investment would almost certainly retard engineers' efforts in keeping pace with competitors. The great essential to-day was leadership on both sides of industry. "We are engaged in a battle for foreign markets and higher living standards. You do not win a battle with the officers and men pulling in opposite directions" he said. "The battle will be won or lost in the workshops."

Mr. CHARLES E. T. CRIDLAND, managing director of Aldis Bros., Limited, addressed a meeting of the Non-ferrous Club at the Queen's Hotel, Birmingham, on April 9. Speaking of profit sharing in industry, he said that to this subject there were two approaches; one doctrinaire and the other practical. Profit, he said, may not in any case be related to the effort of the workmen in a given factory, and he believed that men would work harder if they were paid enough for their additional effort. For instance, in his factory several machines were worked by one man, and for each additional machine which a man worked a proportionate increase in his wages was given. This meant that wages were high, that productivity was high, and the men themselves refused to participate in restrictive practices. At this meeting the constitution of the committee for the new Club year was announced as follows: president, Mr. W. H. Demel; chairman, Mr. P. Mould; secretary, Mr. H. McGhee; treasurer, Mr. W. H. Vizor. Other members: Mr. R. P. Key, Mr. R. Deutsch, Mr. T. B. Taylor, Mr. D. Devereux, Mr. G. E. Lewis. A collection taken on behalf of the National Society for the Prevention of Cruelty to Children yielded £13 12s. 0d.

SOME 400 DELEGATES from industry, research associations, river boards, etc., met at a conference at Birmingham University on April 9, to consider means of checking trade effluents and the pollution of waters by factory wastes. Metals, chromates, cyanides and acids were stated to be causing the worst problems of trade-effluent disposal, and in the Birmingham area the amount of trade waste having doubled since 1948, now accounted for over half the average daily output. The symposium was organized by the Midland branch of the Institute of Sewage Purification, and Dr. S. H. Jenkins and Mr. C. H. Hewitt stated in a joint paper that trade waste could cause the complete breakdown of purification processes. The most important single factor was the need for the management of large firms to realize the urgency of the matter; almost as important was the need to put the treatment of trade effluents in the hands of competent chemists or engineers. Smaller factories, too, need to be reminded of their responsibilities; in aggregate they contribute a high proportion to the wastes. Lack of provision for disposal in building factory extensions was another difficulty mentioned. Ald. A. Paddon Smith said that goodwill and co-operation among all sides was the only way of solving the problems.

March Exports Reached Record Level

A record level was reached for total exports from the UK in March. According to provisional Board of Trade figures, March exports were valued at £313,300,000 compared with £289,000,000 in February. The previous best was £307,500,000 in October, 1956. Imports were at a high—although not a record—level last month. At £361,700,000, they were £41,000,000 more than in February. The trade gap for March widened to £48,400,000, following £31,700,000 in February and £103,900,000 in January.

Comparisons are distorted by shipping dislocation caused by the closure of the Suez Canal. This was one reason for the £41,000,000 rise in March imports, of which it is estimated about half is accounted for by delays because of diversions round the Cape. For the first quarter the monthly average gap of £61,200,000 was nearly double that of the fourth quarter of last year and compares with the 1956 monthly average of £48,000,000.

Engineering & Marine Exhibition

This year is the golden jubilee of the well-known biennial engineering exhibition held at Olympia, London, and to mark the occasion the scope has been altered to include nuclear equipment. The full title thus becomes "Engineering, Marine, Welding and Nuclear-Energy Exhibition"; it will be held from August 29 to September 12. This year there is to be no special section devoted to foundry equipment and supplies.

Personal

Mr. F. PICKWORTH and Mr. R. J. STALLARD, of English Steel Corporation, Limited, have left for the United States on a business trip.

Mr. STANLEY N. LOOSEN has been appointed sales director of the Anti-Attrition Metal Company, Limited, the non-ferrous founders and engineers at Maidenhead, Berkshire.

It is announced that Mr. J. R. ALLAN, the general manager, of Acme Conveyors, Limited, and Acme Ventilating, Limited, has been appointed a director of Acme Conveyors, Limited.

After ten years, Mr. HUGH FULTON is resigning from the position of managing director of Albion Motors, Limited. His successor will be Mr. STANLEY MARKLAND, a director of Leyland Motors, Limited.

Mr. F. E. FENIER, sales manager of Wickman, Limited, machine-tool manufacturers, of Coventry, has been appointed the first Consul ever to be nominated by the King of Norway for the eight Midland counties.

Mr. E. PYCOCK, head of the shipping department of Marshall, Sons & Company, Limited, engineers, of Gainsborough (Lincs), has received a presentation on his retirement after 57 years' service with the company.

Mr. F. M. WRIGHT has been appointed chairman of the Butterley Company, Limited, in succession to the late Mr. E. Fitzwalter-Wright, who died last month. Mr. Wright was formerly vice-chairman and deputy managing director.

British Road Services announce that Mr. S. B. BOWSKILL, assistant branch manager, Birmingham heavy haulage branch, Pickfords division, has been appointed branch manager in succession to Mr. E. BULGIN who retires on May 20.

Alderman WILLIAM ERIC WELSBY, a technical representative for Henley Foundries, Limited, Cradley Heath, Staffordshire, has been nominated as mayor of Newcastle, Staffs, for the coming municipal year. Mr. Welsby has been a member of the Newcastle Council since 1954.

Mr. PETER B. GORST, export manager of Ransomes & Rapier, Limited, Ipswich, founders and engineers, leaves England by air on May 2, for a two-month sales-promotion tour of the Sudan, South Africa, Portuguese East Africa, the Rhodesias, Belgian Congo, Uganda and Kenya.

Sir HUGH BEAVER was elected president for the coming year at last week's annual meeting in London of the Federation of British Industries. Sir Hugh, who is managing director of Arthur Guinness Son & Company, Limited, is a director of Richard Thomas & Baldwins, Limited, and other companies.

Mr. WILLIAM MILLER, joint company secretary of British Timken, Limited, bearing manufacturers, of Duston (Northants), has resigned on medical grounds after having been associated with the company for 20 years. He joined the sales department in Birmingham in 1936 and became secretary in 1940. He moved to Duston when the company's works were opened there in 1942.

Mr. WILLIAM BARNSLEY, founder of William Barnsley, Limited, non-ferrous founders, of Bilston (Staffs), celebrated his 90th birthday with a party for 300 of his friends in Wolverhampton on April 1. He received gifts from the management and employees. Mr. Barnsley is still very active in the company, and on the morning of his party he walked the six miles from his home to the works.

Mr. BERNARD S. PICKUP, regional sales manager of Leyland Motors Limited, for the East Midlands, has been seconded to the company's export division. He left London airport last week for the Indian sub-continent as technical sales representative. Using the factories of Ashok Leyland Limited, at Ennore, Madras, as his headquarters, Mr. Pickup will include in his tour the countries of Ceylon, India and Malaya.

Sir CHARLES CONNELL, immediate past-chairman of the Research Council of the British Shipbuilding Research Association, has succeeded the late Mr. J. W. Elliott as chairman. Sir Charles is chairman of Charles Connell & Company, Limited, the Glasgow engineers and shipbuilders, a director of G. & J. Weir, Limited, engineers and founders, of Glasgow, Scottish Ore Carriers, Limited, the Shipbuilding Corporation, Limited, and a number of other companies.

The principal scientific officer of Newton, Chambers & Company, Limited, Thorncliffe, near Sheffield, Mr. A. H. DODD, has retired after nearly 35 years' service with the company. "In a few weeks' time he is going to live at Flamborough, but I am glad he has consented to be a consultant—on tap whenever we want him," said Mr. P. J. C. Bovill, the managing director, who made Mr. Dodd a presentation of long-playing gramophone records. Mr. Dodd, who is also to receive a pair of high-fidelity earphones, joined the company as deputy chief chemist and bacteriologist. Amongst staff changes, the company announce that Mr. L. V. FISHER, assistant to the trade sales manager (Mr. F. R. James) since 1955, has been appointed assistant sales manager, and Mr. D. A. DOXEY has been appointed administrative assistant.

Obituary

The death occurred recently of Mr. A. PLIMMER, works manager of the Star Foundry, Bradley, Bilston, at the age of 65.

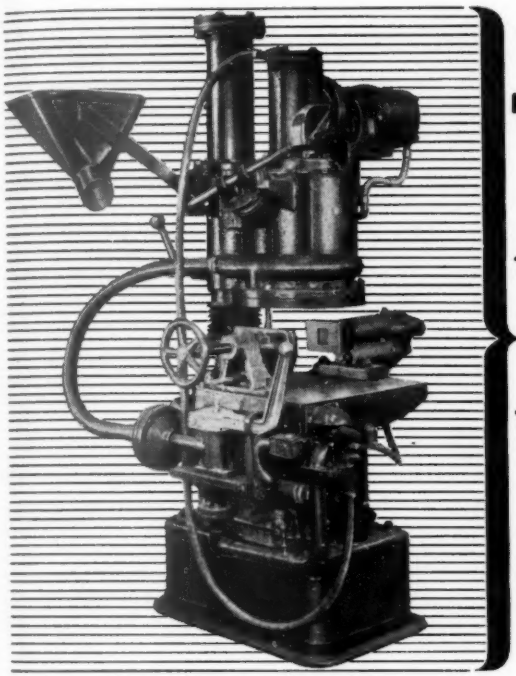
Mr. GEORGE ADAM, Scottish manager of Ingall, Parsons, Clive & Company, Limited, brassfounders, etc., of Birmingham, died on April 8.

MR. LEONARD SLATER, chairman and joint managing director of George Slater, Limited, iron and steel merchants of Sheffield, has died at the age of 54.

Mr. JOHN FISHER, founder member and former joint managing director of Renton & Fisher, Limited, steel founders, of Bathgate, West Lothian, Scotland, died on April 7.

Recent Wills

FRANCIS, COL. H. D. P., solicitor, a director of Head, Wrightson & Company, Limited, Thornaby-on-Tees	£68,933
BEELEY, A. J., metallurgist, steel production manager of Edgar Allen & Company, Limited, Sheffield	£12,236
PARSONS, D. J., for many years a technical representative with the Stanton Ironworks Company, Limited, near Nottingham, in its Colmore Row, Birmingham, office	£9,364



75 lb. sand capacity

PRODUCTION FROM *One*

TITAN MACHINE EQUALS

THE OUTPUT OF *Ten* SKILLED

HAND CORE MAKERS

TITAN

CORE BLOWING MACHINES

can produce better quality cores in a wider range of sizes and types than any other machine on the market, and in mechanical efficiency, reliability, ease of operation and low maintenance costs they are unsurpassed.

THE CONSTRUCTIONAL ENGINEERING Co LTD

TITAN WORKS, CHARLES HENRY ST., BIRMINGHAM 12.

Tel.: MID 4753

Other products include:—AIRLESS SHOT BLAST PLANT, CENTRIFUGAL CASTING MACHINES, SAND DRYERS & MIXERS CUPOLAS DRYING OVENS, MECHANICAL CHARGERS, SPARK ARRESTERS, LADLES, RUMBLERS.

Raw Material Markets

Iron and Steel

Termination of the engineering and shipbuilding strikes brought relief to producers and consumers of pig-iron alike. In the areas affected by the disputes, in addition to a contraction in outputs of pig-iron, many of the foundries were compelled to suspend deliveries against orders on hand and there was also a reduction in new business.

The engineering and speciality foundries supplying the motor vehicle industry continue to receive improved demands for castings and there are prospects of a steady increase in these requirements. This is reflected in a bigger call from these foundries for low-phosphorus pig-iron and hematite, as stocks held by them are diminished. These stocks are not large, as, apparently, it is the intention of the foundries to carry only a working stock commensurate with the business on hand on account of the present economic conditions and their somewhat uncertain future programme. Adequate supplies of pig-iron are at present available for their use as well as for many other users of these grades. Makers of refined irons are not very busy and can accept increased business.

There has been a slight increase in the demand for high-phosphorus pig-iron, mainly from the light foundries making gutters and pipes, but the overall demand for this grade is disappointingly below normal. Seasonal influences have not yet been shown in any appreciable increase in the call for pig-iron, and most producers are obtaining a surplus over present demands. This could, with advantage, be supplied to overseas customers, but licences are difficult to obtain. Producers of basic pig-iron for the steelworks are able to dispose of all their ouputs readily. It is learnt that the two furnaces in the Derbyshire area, which were damped down on account of the engineering strike, are now in production again on basic pig-iron.

The foundries appear to be well provided with scrap and demands mostly comprise heavy machinery and cast-iron scrap. Foundry coke deliveries are satisfactory and adequate supplies of ganister, limestone, and firebricks are available.

Business at the re-rollers for small bars and light sections appears to vary in different areas. From the Midlands reports are received from a number of firms that, although they are able to maintain fairly good outputs with the work on hand, fresh business has declined from both stockholders and consumers for many sizes apart from reinforcing bars, for which there continues a heavy demand. The strip re-rollers have been quiet for some time, but there is now some increase in the requirements of the motor industry.

Deliveries of steel semis from home steelworks are on a good scale and continue to be sent forward at the improved levels. The re-rollers are accepting all available supplies and pressure is sustained for small billets and carbon and special quality steels. Many of the re-rollers are also in need of untested quality steel for orders on hand which call for this grade. Stocks received from overseas have been used up and this grade is only supplied by home steelworks as an incidental product. All arisings of suitable defectives and crops are accepted.

Non-ferrous Metals

Lack of any real incentives to industry in last week's Budget has brought quiet trading conditions to the London metal market. The present reduced activity is expected to continue until after Easter, when it is hoped there will be an expansion of consumer demand.

Copper, assisted as much by favourable sentiment as by demand, is holding its price. Demand is only fair, although inquiry from industry is better and labour troubles have helped. A strike—the most important one—at El Teniente, in Chile, continued until the end of last week. Full production recommenced at the beginning of this week. There is unrest on the Copperbelt among both the European and African workers which may lead to a strike later. Meanwhile, walk-outs of short duration are occurring. London copper stocks are improving and the contango is still in being. In the United States, producers are maintaining their price at 32 cents and business has been erratic, but reasonably good, at this level. Custom smelters are quoting 31½ to 32 cents, with trading being done at the lower level. The export market is quiet, with metal available around 30½ cents per pound.

Tin is more than holding its own in London and in New York. Trading is brisk at times and the volume of metal changing hands appreciable. Demand is best in the East, where strong buying from Japan is a feature. Why this should be so is not clear, but it will be interesting to see the March production figures from Indonesia to judge the effects of the political troubles there on tin output. Bolivian production is not expanding and the point has been made that there may not be the expected world surplus this year of 5,000 to 7,000 tons. There have been vague rumours circulating of impending unrest in Nigeria. In New York consumer buying is quiet, but the market is firm on the better tone in London and the price is only a shade below the $1.00 per pound level.

Lead is quiet in spite of an improvement in the automobile industry. In London the backwardation has disappeared. In New York demand is quietly steady and the price is firm at 16 cents per pound. Zinc is maintaining its improvement, a function of the high level of steel output and the quickening pace of production in the automobile industry. There are no large stocks in Europe, but those in America continue to grow month by month. The price continues to hold at 13½ cents per pound, East St. Louis.

Wolf Electric Tools look Overseas

Although there are vast new development projects within this country, it is in the more backward lands, of Asia and Africa especially, where the scope for development is greatest, states Mr. H. Richards, chairman of Wolf Electric Tools (Holdings), Limited, in the annual report. In India, one of the world's largest potential markets, arrangements were made last year for the local assembly and progressive manufacture of certain of the company's models.

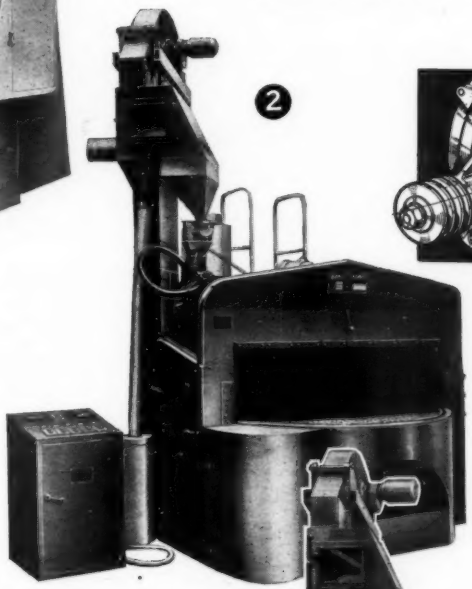
The company again achieved a record value of sales in 1956 with exports making their full contribution. The Canadian branch had its most successful year, and the new Australian subsidiary returned a small profit on only a partial year's working. With the unchanged 20 per cent. dividend and 100 per cent. free scrip issue proposal, for which CIC consent has been obtained, group net profits were, £151,071 (£140,158) after tax of £153,946 (£157,534). Authorized capital is to be increased by creating 2,640,000 new 5s. ordinary shares. There is no present intention of issuing the balance of share capital.

GLOUCESTER RAILWAY CARRIAGE & WAGON COMPANY, LIMITED—General Sir William Morgan has been appointed a director.

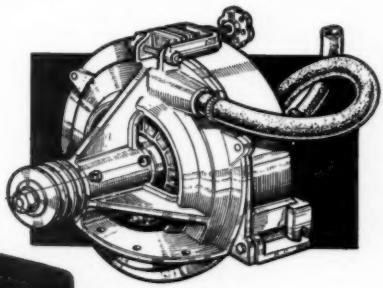
Shot Blast Equipment

This A-S-L Turbine is the most modern Shot Blasting Unit available. The bi-phase air injection system enables shot to be projected at greater speeds using lower power with fewer replacements. The economies effected in spare parts alone are very substantial.

1 ROTARY BARREL



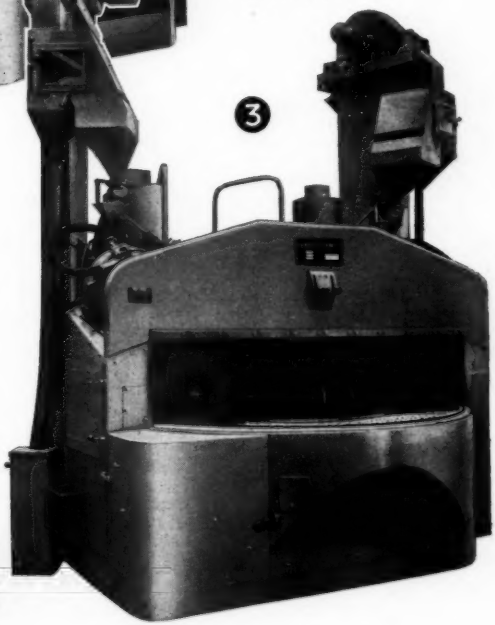
2 CADET



Baker Perkins High Speed Bi-Phase A-S-L Turbine, British Patent, No. 510681.

These machines do not require pits or special foundations.

3 MEDIUM



Our standard range of Rotating Barrel and Table Shot Blast Machines is capable of handling a wide range of Foundry products. Both types are semi-automatic, the rotating barrels being equipped with skip hoist loading gear and frontal discharge mechanism. These modern highly efficient machines are in use in Foundries all over the world, and are built to the high standards of design, materials and workmanship characteristic of all Baker Perkins' machines.

BAKER PERKINS LIMITED
ENGINEERS
WESTWOOD WORKS · PETERBOROUGH

Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

April 16, 1957

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2:—Middlesbrough, £20 1s. 0d.; Birmingham, £19 13s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £21 18s. 0d., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si), d/d within 60 miles of Stafford, £22 2s. 3d.

Scotch Iron.—No. 3 foundry, £23 4s. 6d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £24 6s. 6d.; South Zone, £24 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.—North Zone, £25 14s. 0d.; South Zone, £25 16s. 6d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent.:—N.-E. of England (local iron), £22 17s. 6d.; Scotland (Scotch iron), Zone S. 1, £23 4s. 0d.; Sheffield, £24 4s. 6d.; Birmingham, £24 12s. 0d.; Wales (Welsh iron), £22 17s. 6d.

Basic Pig-iron.—£19 3s. 0d. all districts.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £50 0s. 0d. to £53 5s. 0d., scale 17s. 0d. to 17s. 6d. per unit; 75 per cent. Si, £70 0s. 0d. to £76 7s. 6d., scale 17s. 0d. to 17s. 6d. per unit.

Ferro-vanadium.—50/60 per cent., 28s. 6d. per lb. of V.

Ferro-molybdenum.—65/75 per cent., carbon-free, 12s. 3d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., carbon-free, £250 0s. 0d.; 38/40 per cent., £299 0s. 0d.

Ferro-tungsten.—80/85 per cent., 12s. 4d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 15s. 4d. per lb. of W.

Ferro-chrome (6-10 ton lots).—4/6 per cent. C, £96 0s.0d. to £99 10s. 0d., basis 60 per cent. Cr, scale 33s. 0d. per unit; over 6 per cent. C, £94 0s. 0d., basis 60 per cent. Cr, scale 31s. 0d. to 33s. 0d. per unit; 2 per cent. C,* 2s. 2d. per lb. Cr.; 1 per cent. C,* 2s. 2½d. per lb. Cr; 0.15 per cent. C,* 2s. 3d. to 2s. 3½d. per lb. Cr; 0.10 per cent. C,* 2s. 3½d. to 2s. 3¾d. per lb. Cr; 0.06 per cent. C,* 2s. 3¾d. to 2s. 4d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 7s. 0d. to 7s. 6d. per lb.

Metallic Manganese.—90/92 per cent., carbon-free, £290 0s. 0d.; 96/98 per cent., £310 0s. 0d.

Ferro-columbium.—65/75 per cent. Nb + Ta, 22s. 0d. to 23s. 0d. per lb., Nb + Ta.

Ferro-manganese (home).—78 per cent., £82 12s. 6d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft, u.t., £30 9s. 0d.; tested, 0.08 to 0.25 per cent. C, £31 9s. 0d.; hard (0.41 to 0.60 per cent. C), £32 10s. 6d.; silico-manganese, £41 0s. 0d.; free-cutting, £34 13s. 0d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £38 4s. 6d.; silico-manganese, £41 7s. 6d.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.25 per cent. C, £36 3s. 6d.; basic, hard, over 0.41 up to 0.60 per cent. C, £37 6s. 0d.; acid, up to 0.25 per cent. C, £40 7s. 6d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £39 2s. 0d.; boiler plates (N.-E. Coast), £41 12s. 0d.; floor plates (N.-E. Coast), £40 11s. 0d.; sectional material, N.-E. Coast, £37 11s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., untested (4-ton lots), £37 18s. 0d.; flats, 5 in. wide and under (4-ton lots), £37 18s. 0d.; hoop and strip, £37 17s. 6d.; uncoated strip mill coils, hot rolled, under 3mm. to 12g., £41 6s. 0d.; black sheets (hand mill), 17/20 g., £52 4s. 6d.; galvanized corrugated sheets, 24 g., £65 9s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £65 10s. 3d.; nickel-chrome, £92 13s. 0d.; nickel-chrome-molybdenum, £104 11s. 6d.

NON-FERROUS METALS

Copper.—Cash, £240 10s. 0d. to £241 0s. 0d.; three months, £241 10s. 0d. to £242 0s. 0d.; settlement, £241 0s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 2s. 4¾d. per lb.; rods, 274s. 0d. per cwt. basis; 20 s.w.g., 307s. 3d. per cwt.

Tin.—Cash, £773 0s. 0d. to £775 0s. 0d.; three months, £769 0s. 0d. to £770 0s. 0d.; settlement, £775 0s. 0d.

Lead (Refined Pig).—Second half April, £111 15s. 0d. to £112 0s. 0d.; second half July, £111 10s. 0d. to £111 15s. 0d.

Zinc.—Second half April, £98 5s. 0d. to £98 10s. 0d.; second half July, £94 10s. 0d. to £94 15s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £131 0s. 0d.; rolled zinc (boiler plates), all English destinations, £128 15s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £105.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 11¾d. per lb.; rods, drawn, 2s. 11d.; sheets to 10 w.g., 206s. 6d. per cwt.; wire, 2s. 8¼d.; rolled metal, 206s. 6d. per cwt.

Brass (Brazing).—BS1400, B3 (65/35), £176; B6 (85/15), — ; BS249, —.

Brass (High Tensile).—BS1400, HTB1 (30 tons), £231; HTB2 (38 tons), — ; HTB3 (48 tons), —.

Gunmetal.—BS1400, LG2 (85/5/5/5), £235; LG3 (86/7/5/2), £248; G1 (88/10/2/½), £300: (88/10/2/1), £289.

Phosphor Bronze.—BS1400, PB1 (AID released), — per ton.

Phosphor Bronze Strip, etc.—Strip, 297s. 3d. per cwt.; sheets to 10 w.g., 290s. 0d. per cwt.; wire, 4s. 0½d per lb.; rods, 3s. 3¾d.; tubes, 3s. 4¼d.; chill cast bars: solids 3s. 4d., cored 3s. 5d. (CHARLES CLIFFORD, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 10d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 2¾d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 1¾d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 5½d. per lb. Antimony, English, 99 per cent., £210 0s. 0d. Quicksilver, ex-warehouse, £86 0s. 0d. Nickel, £600 0s. 0d. Aluminium ingots, £197 0s. 0d.; aluminium bronze (BS1400), AB1, £260; AB2, £274.

* Average 68-70 per cent.